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PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when standing alone or in a syllable which ends in silent *e* or when ending an accented syllable.

S is always soft, and never has the sound of *z*.

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch*, as in Bach: (**Bach**, *baK*).

N for the French *n*, as in Breton: (**Breton**, *bre toN*).

ö for the German *ö*, as in Göttingen: (**Göttingen**, *gö'ting en*).

ü for the German *ü*, as in Blücher: (**Blücher**, *blüK'ur*).

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BESSEMER, *bes'e mer*, ALA., founded in 1887 in the coal and iron region of the state, is eleven miles southwest of Birmingham, on seven railroads, the principal ones being the Frisco, the Louisville & Nashville, the Alabama Great Southern, the Southern and the Atlanta, Birmingham & Atlantic. Iron and coal mines are in the vicinity, and the city is noted for the number and variety of its works devoted to the production of iron and steel. The manufacture of fire and building brick is another important industry. The city contains a Carnegie Library and the Bessemer General Hospital. It is governed by a mayor, elected biennially, and a board of aldermen, elected on a general ticket. Jonesboro, a former suburb, is now a part of the city, by annexation. Population, 1920, 18,674; in 1930, 20,721, a gain of 19.6 per cent.

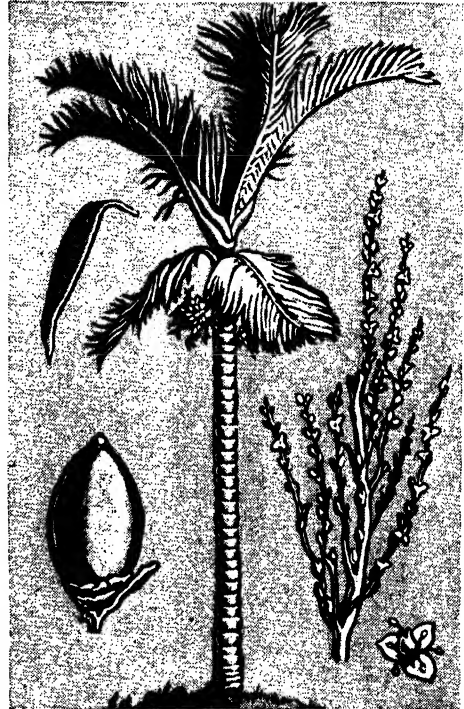
BESSEMER, HENRY (1813-1898), an English scientist and inventor, honored throughout the world for his discovery of the Bessemer process of steel-making, and knighted in 1879 by the British sovereign. In developing his idea, he reversed the process that was then universally employed in treating the molten metal with respect to its carbon content. Not only was a superior product obtained, but it was manufactured at less cost and in shorter time; the Bessemer process completely revolutionized the steel industry, and started it on the way to its present mammoth proportions. See STEEL. in these volumes.

Bessemer was born in Hertfordshire, the son of a maker of type; in the surroundings of the foundry the boy acquired mechanical training, particularly in metallurgy. The development of a gold paint, or bronze powder, provided money to carry on his experiments. The discovery of the new steel process grew out of difficulty in connection with another inquiry. During the Crimean War he devised an improved projectile for cannon which proved too destructive in firing; the gun could not stand the strain of the explosion. Continued efforts to strengthen iron resulted in the Bessemer "converter," the vital element in his new process now universally adopted. It was patented in 1855.

B'ETEL, or **B'ETLE**, the name of two different Asiatic plants—the betel palm and the betel vine. The betel palm is a graceful tree, usually forty to fifty feet high and eighteen inches in circumference. It is the commonest and most important of the areca

palms (see ARECA). Its fruit, the betel nut, which is about the size of a small hen's egg, has a fibrous shell, and the seed, enclosed in the shell, is the betel nut which is chewed by the natives of Oriental nations. It has been estimated that one-tenth of the world's population indulge in betel chewing.

The seeds are boiled in water, cut into slices and dried in the sun. These slices are then wrapped in leaves of the betel vine, a creeping plant of the pepper family, and a small piece of shell lime, cardamon or other flavoring material is added. The pellet is hot and acrid, but has aromatic and



BETEL PALM

astrigent properties. It tinges the saliva, gums and lips a brick-red, blackens the teeth and causes them to decay rapidly. It is doubtful if any good comes from its use, even as an aid to digestion, as claimed, but the custom is so universal with men, women and children, and so continuous, that the proper handling of betel is an important portion of the etiquette in every ceremonial meeting.

A number of different plants nearly related to the peppers, the leaves of which have similar properties, are extensively cul-

tivated and are used by the natives in the same way. Where the climate is not suitable, because of dryness or cold, the vines are cultivated under sheds.

BETH'ANY (now called El-Azariyeh, or Lazarieh), anciently a village of Palestine, at the base of Mount Olivet, about two miles east of Jerusalem. It was the home of Martha, Mary and Lazarus, and was near the place where the ascension of our Lord is said to have taken place.

BETH'EL, a place mentioned frequently in the Old Testament, supposed to have been located about twelve miles north of Jerusalem. There Abraham pitched his tent, and Jacob wrestled with the angel, as related in the book of *Genesis*. The name means *house of God*.

BETHESDA, *be thes'da*, meaning *house of mercy*, was a pool in Jerusalem, near Saint Stephen's Gate and the Temple of Omar. In Bible times it was believed that its waters had healing powers. It is 460 feet long, 130 feet broad and seventy feet deep, and is now known as Birket Israel. In the fifth chapter of *John* there is an account of Christ's healing a lame man at the pool.

BETH'LEHEM, meaning *house of bread*, is the name of a town of Palestine, situated five and one-half miles southwest of Jerusalem, and memorable as the birthplace of Christ. The present town on the site is called Beit Lahm. There are three convents, one each for Roman Catholics, Greeks and Armenians. A richly adorned grotto, lighted with silver and crystal lamps, under the choir of the fine Church of the Nativity, is shown as the actual spot where Jesus was born. The chief trade of the place is in crosses, beads and relics. The town was occupied by the British in 1917, on their march to Jerusalem. Most of the inhabitants are prosperous and progressive Christians. Population, about 1931, 6,817.

BETHLEHEM, Pa., in Lehigh and Northampton counties, fifty-five miles north of Philadelphia, on the Lehigh Canal and Lehigh River, and on four railroads—the Lehigh Valley, the Central of New Jersey, the Philadelphia & Reading and the Lehigh & New England. Crossing the river are two bridges 700 and 1,100 feet long. The town is widely known as a steel-making center; there are also manufactures of silks, knit goods, hosiery and paint. The Church of the Nativity is an imposing structure; there are two public li-

braries, and a hospital. Lehigh University and Moravian Theological Seminary are in Bethlehem. Population, 1930, 57,892.

BETHMANN-HOLWEG, *bat'e'man hol'-vayK*, THEOBALD THEODORE VON (1856-1921), the fifth Chancellor of the German Empire. He was appointed to the post in 1909 and retained it until driven from power during a critical period of the World War, resigning in July, 1917.

As the representative of the emperor, to whom alone the Chancellor was responsible, he opposed the vote of the Reichstag calling for peace without annexations or indemnities, although personally favorable to it. Bethmann-Holweg was opposed to the policy of torpedoing vessels without warning.

Early in life he entered the public service, becoming provincial president of Potsdam, then president successively of the governments of Bomberg and Brandenburg. In 1905 he was appointed Minister of the Interior and Vice-Chancellor, under Bilow, and succeeded the latter as Chancellor four years later.

BEVERIDGE, *bev'er ij*, ALBERT JEREMIAH (1862-1927), an American statesman, for twelve years a United States Senator from Indiana. He was born on a farm in Ohio. He went with his parents to Illinois soon after the close of the Civil War, and later moved to Indiana, where he attended De Pauw University, graduating in 1885. He studied law, and after his admission to the bar he rapidly attained prominence. In the Senate, which he entered in 1899, as a Republican, he was known as one of the most forceful speakers in that body. In 1912 he was the Progressive candidate for governor of Indiana, but was defeated. As writer and historian he had marked success, notably in *The Russian Advance* (1903), *Invisible Government* (1912), *Life of John Marshall* (4 Vols. 1916-1919), *Abraham Lincoln* (1928).

BEYROUT, *ba'root*. See BEIRUT.

BHUTAN, *bu tahn'*, an independent state in India, north of Bengal and south of the Himalaya Mountains. It contains 16,800 square miles—is about half as large as Maine—and a population of 250,000, of the Bhotias race, who are Buddhists. Corn, rice, wheat and buckwheat are raised, although not all of the country is fertile. The government is under the dual control of the clergy and the laity, but English influence is paramount.



Form of early Bible

BIBLE, the book that today, in part or in whole, is the religious guide of nearly one-third of the human race. Of all books, secular or religious, it has had by far the widest distribution over the world. The whole Bible or portions of it have been translated into 400 languages and dialects, and it is read by natives of the Pacific islands, by the American Indians, by remote tribes in Africa, by Japanese, Chinese, Arabians, Persians, the inhabitants of India and many other peoples. A traveler journeying over the globe would find few inhabited regions in which the Bible was unknown, though he might notice the lack of countless articles considered essential to his comfort at home.

This unique book is really a library, or collection of books. The name is derived from the Latin *biblia*, which in turn is a transcription of a Greek word meaning *little books*. The modern singular form therefore reminds us that the Bible is an entity, while the Greek plural emphasizes the fact that it is "many books in one." Its two general divisions are the Old and the New Testament, the former dealing with Jewish history before the time of Christ. Christians alone accept as inspired writings the books of the New Testament. Altogether there are sixty-six books.

Books of the Old Testament. The books of the Old Testament, thirty-nine in number, are as follows:

Genesis	Ezra	Daniel
Exodus	Nehemiah	Hosea
Leviticus	Esther	Joel
Numbers	Job	Amos
Deuteronomy	Psalms	Obadiah
Joshua	Proverbs	Jonah
Judges	Ecclesiastes	Micah
Ruth	Song of Solomon	Nahum
I and II Samuel	Isaiah	Habakkuk
I and II Kings	Jeremiah	Zephaniah
I and II Chronicles	Lamentations	Haggai
	Ezekiel	Zechariah
		Malachi

The first five of these books are grouped together as *books of the law* (Pentateuch); those from *Joshua* to *Esther*, inclusive, are *historical books*; *Job*, *Psalms*, *Proverbs*,

Ecclesiastes, *Song of Solomon* and *Lamentations* are poetry; the sixteen remaining are prophecies, and are subdivided into *greater* and *minor*. The authorship and date of all of these books cannot be stated positively. It was long believed that Moses wrote the books of the law and that David was the sole author of *Psalms*, but modern scholarship rejects both of these suppositions. While there is considerable evidence for assigning definite authors to some of the Old Testament writings, the authorship of many of the books is unknown.

Books of the New Testament. It is not a difficult matter to divide the twenty-seven books of the New Testament into three logical groups. The first five books—*Matthew*, *Mark*, *Luke*, *John* and *Acts of the Apostles*—are historical, relating to the life of Christ and the labors of His followers who planted the new Church in Jerusalem and abroad. Then come the epistles, many of which are the work of Paul, and finally the prophetic vision of John, called the *Book of Revelation*. The complete list is as follows:

Matthew	I. Timothy
Mark	II. Timothy
Luke	Titus
John	Philemon
The Acts	To the Hebrews
Romans	Epistle of James
I. Corinthians	I. Peter
II. Corinthians	II. Peter
Galatians	I. John
Ephesians	II. John
Philippians	III. John
Colossians	Jude
I. Thessalonians	Revelation
II. Thessalonians	

The Apocrypha. There are a number of sacred books not accepted by Protestants as authorized parts of the Bible, and to these the name Apocrypha has been applied. They are, however, accepted by the Roman Catholic Church. See APOCRYPHA.

Bible Versions. The earliest and most famous version of the Old Testament is the Septuagint, or Greek translation, executed by Alexandrian Greeks, and completed probably before 130 B. C. This version was adopted by the early Christian Church and by the Jews themselves and has always held an important place in the interpretation and history of the Bible. The Syriac version, the Peshito, made early in the second century after Christ, is celebrated for its fidelity. The Coptic version was made from the Septuagint, in the third or fourth century.

The Gothic version, by Ulphilas, was made from the Septuagint in the fourth century, but mere insignificant fragments of it are extant. The most important Latin version is the Vulgate, executed by Jerome, partly on the basis of the original Hebrew, and completed in A. D. 405.

The printed editions of the Hebrew Bible are very numerous. The first edition entire was printed at Soncino in 1488.

The books of the New Testament were all written in Greek, unless it be true, as some critics suppose, that the gospel of *Saint Matthew* was originally written in Hebrew. Most of these writings have always been received as inspired; but the *Epistle to the Hebrews*, commonly ascribed to Saint Paul, that of *Saint Jude*, the second of *Peter*, the second and third of *John* and *Revelation* have been doubted. The three oldest manuscripts are: 1, the Sinaitic manuscript, discovered by Tischendorf in a convent on Mount Sinai in 1859, assigned to the middle of the fourth century; 2, the Vatican manuscript at Rome, of similar date; 3, the Alexandrian manuscript in the British Museum, assigned to the latter half of the sixth century. Each manuscript contains also in great part the Septuagint Greek of the Old Testament. The division of the text of the New Testament into chapters and verses was introduced later than that of the Old Testament, but it is not precisely known when or by whom.

Of translations of the Bible into modern languages the English and the German are the most celebrated. Considerable portions were translated into Anglo-Saxon, including the Gospels and the Psalter. Wycliffe's translation of the whole Bible (from the Vulgate), begun about, 1356, was completed shortly before his death, 1384. The first printed version of the Bible in English was the translation of William Tyndale, whose New Testament was printed in quarto at Cologne in 1525, a small octavo edition appearing at the same time at Worms. He also published the Pentateuch in 1530 and translated some of the prophetic books. Our translation of the New Testament is much indebted to Tyndale. A translation of the entire Bible, undertaken at the instance of Thomas Cromwell, was published by Miles Coverdale in 1535 and, being made from German and Latin versions, was inferior to Tyndale's.

The first Bible printed by authority in England was an edition with a preface by Cranmer, hence called *Cranmer's Bible*. A royal proclamation in 1540 ordered it to be placed in every parish church. This continued, with various revisions, to be the authorized version till 1568. In 1557-1560 an edition appeared at Geneva, based on Tyndale's—the work of Whittington, Coverdale, Goodman, John Knox and other exiles, and commonly called the *Geneva*, or *Breeches*, *Bible*, from "breeches" standing instead of "aprons" in *Genesis* III, 7. This version, the first printed in Roman letters, and also the first to adopt the plan, previously adopted in the Hebrew, of a division into verses, was for sixty years the most popular in England and was allowed to be printed under a patent of monopoly in 1561. It omitted the Apocrypha, left the authorship of the *Epistle to the Hebrews* open and put words not in the original in italics. The *Bishop's Bible*, published 1568 to 1572, revised by Archbishop Parker and eight bishops, succeeded Cranmer's as the authorized version, but did not commend itself to scholars or people. In 1582 an edition of the New Testament, translated from the Latin Vulgate, appeared at Rheims, and in 1609-1610 the Old Testament was published at Douai. This is the version recognized by the Roman Catholic Church.

King James's Version. In the reign of James I a Hebrew scholar, Hugh Broughton, insisted on the necessity of a new translation, and at the Hampton Court Conference (1604) the suggestion was accepted by the king. The work was undertaken by forty-seven scholars, divided into six companies, two meeting at Westminster, two at Oxford and two at Cambridge, while a general committee meeting in London revised the portions of the translation finished by each. The revision was begun in 1607 and occupied three years, the completed work being published in folio in 1611 and known as *King James's Bible*. Through the general accuracy of its translation and the purity of its style, it superseded all other versions. In response, however, to a widespread desire for a translation even freer from errors, the Convocation of Canterbury in 1870 appointed a committee to consider the question of revising the English version. Their report being favorable, two companies were formed, one for the Old Testament and one for the New, consisting partly of members of the Convocation and

partly of outside scholars. Two similar companies were also organized in America, to work along with the British scholars. The result was that the revised version of the New Testament was issued in 1881; that of the Old Testament appeared in 1884. An *American Revised Version* appeared in 1901.

The Bible as Literature. Macaulay says in one of his essays, "If everything else in our language should perish, the English Bible alone would suffice to show the whole extent of its beauty and power." There are so many passages of high literary quality in the "Book of Books" that innumerable citations could be made to show the beauty and power of its language. Several passages from *Isaiah*, for example, were used by Handel as a setting for the matchless music of his *Messiah*, and the rhythm in each case is perfectly adapted to the noble melody. The *Psalms*, too, have been chanted and sung for centuries.

There are countless examples of beautiful figures of speech in the Bible, and practically every form of literature is found in its pages—the epic, the allegory, the parable, the short story, the historic narrative, the song of rejoicing, the dirge, and so on. Secular literature is permeated with allusions to the Bible, and whoever would aspire to a general culture cannot afford to ignore this great literary monument.

Related Articles. Consult the following titles for additional information:

Aaron	Edom
Abel	Eli
Abraham	Elijah
Abasalom	Elisha
Acts of the Apostles	Ephesians, Epistle to
Adam and Eve	Esau
Ahab	Esther
Ahasuerus	Ezekiel
Ahaz	Ezra
Amos	Felix, Antonius
Ananias	Festus, Porcius
Apocalypse	Gabriel
Apocrypha	Gamaliel
Ark	Gath
Baal	Gehenna
Babel, Tower of	Gideon
Balaam	Goliath
Barnabas	Goshen
Bartholomew	Gospels
Beelzebub	Habakkuk
Calaphas	Haggai
Cain	Hallelujah
Calvary	Ham
Canaanites	Herod
Chronicles, Book of	Herod Agrippa I
Cities of Refuge	Herod Agrippa II
Corinthians, Epistle to	Herod Antipas
Daniel	Hezekiah
David	Hittites
Deborah	Hosea
Decalogue	Isaiah
Deiliah	Ishmael
Deluge	Jacob
Douai Bible	James, Saint
Ecclesiastes	Japheth
Eden	Jehoshaphat

Jephthah
Jehovah
Jehu
Jeremiah
Jeroboam
Jerusalem
Job
Joel
John, the Baptist
John, Saint
Jonah
Joseph
Joseph of Arimathea
Joshua
Josiah
Jubilee
Judah
Judas
Jude
Judges, Book of
Lamentations
Lazarus
Leviathan
Levites
Leviticus
Lucifer
Luke, Saint
Magdalen, Mary
Malachi
Manna
Mark, Saint
Mary, The Virgin
Matthew, Saint
Michael, Saint
Miracle
Moabite Stone
Moses
Nehemiah

Noah
Numbers, Book of
Passover
Patriarchs
Paul
Pentateuch
Pentecost
Peter
Pharisees
Philip
Philistines
Pilate, Pontius
Proverbs, Book of
Psalms, Book of
Ruth, Book of
Sadducees
Samaritans
Samson
Samuel
Sanhedrin
Saul
Scapegoat
Septuagint
Sinai
Sodom
Solomon
Tabernacle
Tabernacles, Feast of
Targum
Thessalonians, Epistle to the
Thomas, Saint
Timothy
Titus
Vulgate
Zebulun
Zedekiah
Zephaniah

Bible Stories. The stories which follow include some of the most valued and best loved narratives of the Old Testament. This material gives a picture of the Israelitish people from the settlement of Abraham in the Land of Canaan to the period after the capture of Jerusalem by Nebuchadnezzar. No special attempt has been made to emphasize the moral teachings of these stories, for in most cases the lesson lies in the heart of the story. The literal language of the Bible has been replaced by a style which children and young people will understand and enjoy.

These stories, which have been carefully selected, will provide excellent material for the mother accustomed to having a daily story-telling hour with her children. Bible narratives are full of action, they abound in character portrayal, and they make an appeal to the emotions which humanity experiences today. They are valuable both for their spiritual and for their educational appeal. No child can listen unmoved to the story of David's slaughter of the giant Goliath, or the rescue of little Moses in his cradle on the water. By telling Bible stories to her children the mother instills in their young minds a fondness for the literature of the Scriptures, and so prepares the way for a deeper acquaintance with the greatest religious writing ever produced.

Stories From The Old Testament

EARLY STORIES OF THE HEBREWS

Abraham and Isaac

In the early days of Bible story there lived in the land of Ur of the Chaldees a man named Abram. Ur of the Chaldees was a city of Mesopotamia, which is the land between the Euphrates and the Tigris rivers, in Western Asia. There is today a ruined temple on the west bank of the Euphrates River, at the place where a canal joins that stream and the Tigris, and Bible students tell us that in the time of Abram Ur lay at the point where the temple may be seen. Abram was a rich man; he owned large herds of cattle and flocks of sheep, and he had many servants. But there came a time when it was revealed to him that he must depart from the country of Mesopotamia and go to a land called Canaan, on the eastern shore of the Mediterranean Sea. It would be interesting to trace on a map that long, toilsome journey over desert, stream and mountain. After he had settled in his new home, God told him that he was to be the father of a chosen people, and that his descendants were to possess all the land of Canaan. Kings were to come from his race, and he himself was to be called Abraham, which means "father of a multitude." A son, too, was promised him, for Sarah, his wife, was childless.

When, at last, a little son was born to Abraham and Sarah, they were so happy they named him Isaac, for Isaac means "laughing." The child became a great comfort to his parents, and Abraham loved him above all other things. In those days men offered up sacrifices as a part of their religious duty. Very often they would kill a choice lamb out of the flock, and burn it on the altar as a sacrifice. One day God spoke to Abraham and said, "Take thy son Isaac, whom thou lovest, and go to the land of Moriah; thou must offer him there as a burnt offering, upon a mountain which I will tell thee of." There is nothing in the Bible record to make us think that Abraham rebelled or complained when he

received this strange command. Early in the morning he saddled his ass, gathered the wood for the offering, and departed with Isaac and two young men-servants. On the third day he saw a summit in the distance that he knew to be the place of sacrifice, and he said to his servants, "Wait here; I and the lad will go yonder and worship, and will come again to you."

Then Abraham and Isaac went on together; Isaac carried the wood, and his father bore the fire. The lad did not understand why they were going up to the mountain, and he said to Abraham, "Father, here is fire and wood, but where is the lamb for a burnt offering?" "My son," was the reply, "God will provide himself a lamb for a burnt offering." When they came to the place of sacrifice, Abraham built an altar, arranged the wood upon it, and then placed his boy on the wood. But just as he was about to lay his hand on him he heard a voice saying, "Abraham, Abraham." He answered, "Here am I." Then the voice said, "Lay not thine hand upon the lad: for now I know that thou fearest God." And Abraham knew then that God was testing him, to see whether he was willing to give up the dearest treasure he possessed. But he was not required to give up his son, for as he looked about him he saw a ram caught in a thicket by the horns, and he took the ram and offered it as a burnt offering. But because he had been obedient to the divine voice, and had not refused to give up that which he loved most dearly, Abraham received greater blessings than ever before.

The Marriage of Isaac

In the course of time Sarah died, and was buried in a cave which Abraham bought as a tomb for his family. Then, as he felt himself growing old, and saw his son Isaac grow to manhood, he said to himself that he would like to have Isaac married. Now most of the people who lived in the land of Canaan worshiped

idols, and Abraham decided that his son ought to seek a wife in Mesopotamia, where several of their kindred still lived. These far-away kinsmen believed in the true God, whom Abraham and Isaac worshiped. So Abraham called his oldest servant, the one who took care of his flocks and herds, and bade him go into that country and find there a wife for Isaac. Then the servant took ten of his master's camels and some beautiful gifts, and journeyed to the land in which Abraham had lived so many years before.

After a time the servant came near to a city in Mesopotamia which had a well outside the gate. It was just at the close of day, and the women were coming out of the city to draw water. The servant had his camels kneel down by the well to rest, and then he prayed to God to show him which one of the women that came to draw water should be Isaac's wife. It was revealed to him that he should ask one of them for water to drink, and if she answered kindly he would know she was the one to be chosen. While he was pray-

to her and said, "Let me, I pray, drink a little water out of thy pitcher." She answered, "Drink, and I will draw water for the camels also." Then she let down the pitcher from her shoulder and gave the servant a drink, and afterward she carried water to the camels. When Rebekah had performed these services the servant gave her a gold earring and two gold bracelets. He inquired whose daughter she was, and asked whether he and his men could sleep at her father's house. The young woman told him that she was the daughter of Bethuel, and that there was room at their house for all, and food for the camels. The servant rejoiced greatly when she told him these things, for he knew that Bethuel was a kinsman of Abraham, and that God must have guided him to their place.

Then Rebekah ran home and told her people all that had happened. Her brother Laban, when he saw the earring and bracelets, hastened at once to the well and invited the servant to come to their house and to bring his camels and their keepers. And they were all treated most kindly and made welcome. But before the servant would accept any food he told Rebekah's family who he was and why he had come to their city. And he begged them to say at once whether they would let Rebekah go home with him. As Bethuel and Laban listened to the story they felt it was God's will that Rebekah should be the wife of Isaac, and they at once consented to her going away. The happy servant, on hearing these words, brought out costly jewels of gold and silver and beautiful garments, and he gave Rebekah and her mother and brother many handsome gifts. Then they had a merry feast, and the next morning the travelers departed, taking with them Rebekah and her nurse.

As they were passing through the land of Canaan one evening, they came near to the place where Isaac was. He had gone into the fields to walk about by himself, and when he saw the train of camels he hastened toward the travelers. As he came nearer Rebekah noticed him and said to the servant, "Who is this man



THE SERVANT MEETS REBEKAH

ing, a beautiful, dark-eyed girl named Rebekah, carrying a pitcher on her shoulder, came up to the well. And when she had filled her pitcher the servant ran up

walking to meet us?" When the servant told her that it was Isaac, she covered her face with a veil, and as soon as he came up to her she climbed down from her camel and Isaac took her into the tent his mother had lived in. He made her his

wife, and he loved her so dearly that he was comforted for the loss of his mother. After the marriage Abraham gave all his herds and flocks to his son, and when he died Isaac buried him in the cave where Sarah rested.

THE TWO BROTHERS

A Story of Forgiveness

Jacob and Esau were the twin sons of Isaac and Rebekah. The two boys were very different in looks and in character, and, as sometimes happens in families to-day, one was the favorite of his father, and the other the favorite of his mother. Esau, the elder, was a rough, hairy fellow who grew up to be a famous hunter, while Jacob was content to stay at home and take care of his father's flocks. Esau would go into the fields and kill deer, and then bring back to his father the delicious venison. But the homeloving Jacob was the favorite of his mother. In those days the eldest son was the most important of all the children. He received the greater share of the cattle and other property when the father died, and was favored above all the other sons. This special favor was called the birthright. As Esau was older than Jacob, he was entitled to the birthright, but he did not appreciate it as he should have done. One day, after he had been out hunting, he came home faint and hungry. Jacob had just cooked a savory vegetable food called pottage, and when his brother saw it he said, "Give me, I pray, the pottage to eat, for I am very faint." But Jacob said, "Sell me this day thy birthright." Now Esau thought only of satisfying his hunger, and he said to himself, "If I do not get food to eat at once I will die, and what good will my birthright be to me then?" Thus he weakly yielded to the temptation and sold his precious birthright.

As the years passed by Isaac became feeble and his sight grew very dim. One day he said to Esau, "Take thy bow and kill a deer, that I may taste again the venison that I love. Then I will give thee my farewell blessing." This special blessing was bestowed in those days, on

the eldest son, and was one of the privileges of the birthright. Esau gladly departed to do his father's bidding. Rebekah, however, had overheard Isaac's words, and she was displeased that Esau should be placed above her favorite, Jacob. Therefore, as soon as Esau was out of sight, she told Jacob to bring to her two small goats from the herd. When he had done so she cooked the meat and made it taste like the venison of which Isaac was so fond. Then she had Jacob dress himself in Esau's clothes, and she put the skins of the goats on his hands and his neck, that he might seem to be a hairy man like his brother. When Jacob told her he feared that a curse would come upon him for deceiving his father,



JACOB RECEIVING THE BLESSING

Rebekah replied, "Upon me be the curse, my son: only obey my voice." Then Jacob presented himself to Isaac, and

the aged man felt of the hairy hands and believed that his eldest son was before him, though his voice was the voice of Jacob. When he had eaten of the meat which Rebekah had prepared, Isaac drew his son close to him, smelled of his garments, which had the smell of woods and fields, and gave him the prized blessing.

On Esau's return from the hunt he prepared a savory piece of venison for his father, and offered it to him, begging for his blessing, as had been promised. Trembling and dismayed, the old man cried out, "Who art thou?" And when Esau told him that he was his first born son, Isaac knew that Jacob had stolen his brother's blessing. Exceedingly bitter was Esau's sorrow when he found out that he had been cheated, and in his anguish he cried, "Bless me, even me also, O my father." Isaac was indeed glad to bless him, but he had promised the best things to Jacob, and he dared not revoke his solemn words. Esau could not control his feelings of disappointment and anger, and it was soon reported to Rebekah that he had threatened to kill his brother. Therefore the mother advised Jacob to go away to the home of her brother Laban, in another country. And in due time Jacob departed. So we see that his selfishness and greed sent him into exile and separated him from all that he loved.

It was many years before the brothers met again. At the home of Laban Jacob received a kindly welcome, and he fell deeply in love with Rachel, the younger of his uncle's two daughters. Laban promised him that if he would serve him for seven years he could have Rachel for his wife, and so great was Jacob's love for her that the seven years of service seemed short, indeed. But when the time was up Laban consented to the marriage only when Jacob promised to serve him another seven years. As time passed by Jacob prospered greatly, and many sons were born to him. Then, at the end of twenty years, he decided to return to his own country. So he gathered together his flocks and herds, and departed with his family and servants.

In all these years Jacob and Esau had never been reconciled, and as Jacob approached the place where his brother was living he sent men ahead with a friendly message, for he still feared his anger. The messengers told Esau of Jacob's prosperity during his sojourn with Laban, and of his hope that the past might be forgotten, but they returned with bad news. Instead of a message of friendship they came with a report that Esau was planning to meet his brother with four hundred men. That night Jacob prayed earnestly to God to save him from his brother's wrath, and the next day he sent his servants ahead of him with presents of goats and camels. When Jacob saw Esau approaching with the four hundred men he ran to meet him alone, and bowed down on the ground before him. All of Esau's anger melted away at sight of his brother, and he embraced him tenderly. Then they wept for joy that all was made right between them, and Jacob had his children come forward and greet their uncle. Esau asked about the droves and herds which had been sent ahead, and when Jacob told him they were gifts for him, he replied, "I have enough, my brother; keep that thou hast unto thyself." But Jacob insisted that he keep them, for he wanted his brother to know that the old spirit of greed had left his heart. The same day Esau departed to his own home, but Jacob journeyed on and came finally to Hebron, in Canaan, where his old father, still alive, was sojourning. The land of Canaan became his home once more, and there he reared twelve sons who became founders of the Twelve Tribes of Israel.

Of all the sons of Jacob, the one he loved most dearly and favored the most, was Joseph. There is a very interesting story about this son, who was sold into slavery because of the jealousy and cruelty of his older brothers. This story is told in detail in these volumes in the article STORY TELLING. It shows how the Israelites came to settle in Egypt, and is the connecting link between the story related above and the one which follows on the next page.

THE ISRAELITES DELIVERED FROM BONDAGE

The Descendants of Jacob in Slavery

During a time of famine the patriarch Jacob and all his people left the land of Canaan and took up their abode in Egypt. Jacob was then a very old man, and when he died his sons carried his body back to the old home and buried it there. But the children and grandchildren of the patriarch, to the number of about seventy, remained in the land of the Egyptian kings, who were known as Pharaohs. As the years passed by, the Hebrews, or children of Israel, as they are usually called, grew to be a great multitude of people, and the land of Egypt was filled with them. The Pharaoh who ruled in Jacob's time was kind and just to the Israelites, but later a king came to the throne who made slaves of them. "Behold," he said, "the people of the Children of Israel are more and mightier than we. We must keep them from multiplying or they will join our enemies and fight against us." So he set taskmasters over them, who treated them cruelly and forced them to build cities and labor in the fields. But they continued to grow in numbers.

Then Pharaoh told the women who took care of the little children of the Israelites to kill all the boy babies as soon as they were born, but they refused to do so wicked a thing. Next he ordered the Egyptians to cast into the river all the little boys who were of the despised race.

The Story of Moses

Among the Israelites there was a woman named Jochebed, who had a beautiful child that she was determined to save. She kept him hidden until he was three months old, and then, fearing that he would be discovered by Pharaoh's servants, she made a little ark out of some weeds that grew by the river. She covered the ark with asphalt and pitch, so that water could not enter it, and in it she placed her baby boy. Then she set the boat down among the rushes by the water's edge, and told her little daughter to watch it carefully. Not long afterward Pharaoh's daughter and some of her

maids came down to the river to bathe. As the princess walked along the bank she noticed the queer little boat, and ordered one of her maids to bring it to her. When she opened it and saw the tiny child within she was moved to pity,



THE FINDING OF MOSES

for the little fellow began to cry. "This," she said, "is one of the Hebrew children." Then Miriam, the baby's sister, ran up and said, "May I not go and call one of the Hebrew women to nurse the child for thee?" "Go," said the princess, and Miriam ran to her own mother with the joyful news. Then when Jochebed came to Pharaoh's daughter the princess told her to take the child home and nurse it, and promised that she would pay for its keep. Later the boy was placed in the royal palace and was brought up as the adopted son of Pharaoh's daughter. She named him Moses, because that word means "drawn out," and she had drawn him out of the water.

When Moses had grown to manhood he did not forget his own people. As he went among them and saw the burdens they had to bear he longed to help them, and he felt that it was a greater honor to

be one of the Children of Israel than to be the rich and powerful son of a princess. It so happened that he went one day to a place where some Israelites were working, and saw an Egyptian cruelly beating a Hebrew. He could not bear to see one of his blood so mistreated, and he struck the Egyptian down and killed him. This act was reported to Pharaoh, and when he heard of it Moses had to flee for his life. After wandering for some time he came to the land of Midian, which lay in the Arabian desert. As he sat down by a well to rest, seven sisters came to the place to draw water for their father's flock. A band of rough shepherds tried to drive them away, but Moses came to the rescue of the sisters and also helped them water the sheep. These young women were the daughters of a priest named Jethro. When they arrived at home they told their father that an Egyptian had saved them from the shepherds, and had drawn water for them, and he bade them return to the well and invite the stranger to eat with them. It came to pass that Moses remained in the home of Jethro and helped him care for the flocks, and in the course of time he married one of Jethro's daughters.

During the time that Moses was in exile a new Pharaoh came to the throne of Egypt, but he was even more cruel than the king before him. And as the Children of Israel cried aloud in their misery, God heard them and took pity upon them. One day as Moses was tending the sheep on Mount Horeb, far out in the wilderness, he heard the voice of God speaking to him from a burning bush. He was told that God has seen the sorrows of the Israelites, and that he had been chosen to lead them out of the land of bondage into the country where Abraham and Isaac and Jacob had dwelt. This was Canaan, the Promised Land. Now, Moses was a modest man, and he feared that he would not be able to carry out so mighty an undertaking. But God promised to be with him at every step of the way, and to send his brother Aaron to help him. Aaron was a man of eloquence, and it would be his duty to tell the people what God should reveal to

Moses. When he had heard these words, Moses returned to the home of Jethro and obtained leave to go to Egypt to see his people.

Then it was revealed to Aaron that he should go into the wilderness to see his brother, and he found him on Mount Horeb. When Moses had told Aaron all that had been shown him, the brothers departed to Egypt to fulfill their mission. Many trials and discouragements awaited them there. First they had to gain the trust of the chief men of the Israelites, and then win the confidence of the people themselves. After this they went to Pharaoh and said, "The Lord God of Israel asks that His children be permitted to go into the wilderness for three days to offer up a sacrifice." These words made Pharaoh very angry, and he not only refused to let the people go, but he added to their burdens. At this time the Israelites were digging clay out of the earth, and forming it into bricks. These bricks were dried and hardened in the sun. Now the clay had to be mixed with straw to make the bricks tough and strong, and the straw was collected in the fields by men who brought it to the workers. In his anger Pharaoh made a rule that brick-makers were to go into the field and gather the straw themselves, but they must make just as many bricks as before. Of course the Israelites could not work so fast when they had to wander about the fields in search of straw, and their taskmasters called them idlers and beat them cruelly when they fell short of the required number.

The Escape from Egypt

When Moses heard of this he prayed to God for guidance, and was given a new promise that the people would surely be delivered from their bondage. But Pharaoh was hard and stubborn, and before he would consent to let the Israelites depart he saw his own people afflicted by terrible plagues, sent by God as a punishment. The first plague was that of waters of blood. Aaron, at Moses' command, lifted up his rod and smote the water in the river, and at once the waters all over the land

were changed into blood. Then all the fish died, and the people sought in vain for water to drink. For seven days this curse was on the land, but Pharaoh's heart remained hard, and he would not let the Israelites go. Then came the plague of frogs. God told Moses to have Aaron stretch forth his rod over the streams and rivers, and as he did so multitudes of frogs came up out of the waters and covered the land from one end to the other.

Then Pharaoh grew fearful and asked Moses and Aaron to intreat the Lord to remove the plague. And he said, "I will let the people go, that they may do sacrifice unto the Lord." But the next day, when he saw that all the frogs had died, he hardened his heart and would not keep his promise. Many other plagues tormented the land before Pharaoh repented. Men and beasts were covered with loathsome creeping things; swarms of flies filled the houses of the people; the cattle and horses and sheep were afflicted by a deadly disease; and there were plagues of boils, of hail and fire, of locusts and of black darkness. But God protected the Children of Israel from these dreadful things, and afflicted only the Egyptians.

At last the time came when the people were to depart from the land of bondage. Pharaoh still refused to let them go, and he had to suffer one final punishment for his stubbornness. Moses told him that at midnight the angel of death would pass through the land and smite the eldest son in each household; that the king's eldest son would die, and the eldest son of each of his servants, and all over the land there would be cries of grief; but not one of the Israelites would be harmed.

Everything came to pass as Moses prophesied. A few days before the night of sorrow every man among the Children of Israel was commanded to take a lamb from the flock and keep it four days. Afterward he was to kill it in the evening, and to dip in its blood a bunch of the hyssop plant. Then he was to strike the plant upon each side of his door and above it, so that there would be three marks of blood on the outside of every house among the Israelites. And the

lambs which had been killed were to be roasted, and the people in each house were to feast. The Israelites obeyed all of these commands, and at midnight of the night on which they feasted the death angel went through the land and caused the first born son in every Egyptian family to die. But he passed over the houses with marks of blood on the door, and in honor of this the supper of the lamb was called the Feast of the Passover.

When Pharaoh heard the cries of grief in his own house, and knew that there was sorrow in every Egyptian home in the land, he could bear no more. Therefore he called for Moses and Aaron and told them to go out of Egypt and to take all the Children of Israel with them. And in the morning the great host of people departed, with all their flocks and herds.

There were two ways to travel toward the Promised Land—a short way through the country of the Philistines, and a longer route by way of the Red Sea. God showed Moses that he was to lead the people across the Red Sea, for it would be dangerous to go through the land of the warlike Philistines. As they journeyed they were guided during the day by a cloud that always went before them, and seemed like a tall pillar reaching to heaven; but at night the pillar glowed like fire and gave them light.

It came to pass that after the Israelites had departed Pharaoh began to feel sorry that he had let them go. So he gathered together a great host of men in chariots and on horses, and they followed after the Israelites and overtook them on the shores of the Red Sea. When the people saw the great army coming towards them they were badly frightened and cried out to Moses, "Because there were no graves in Egypt must we be carried here to die in the wilderness?" But Moses calmed them and told them that God would not desert them. Then the cloud which traveled before the Israelites was moved that night from its place and came between them and Pharaoh's army, and the side of it which was turned towards the Egyptians grew dark, so that they could not see their way. But on the side toward the Israelites it glowed

like fire. Then God commanded the Israelites to move forward, and Moses was com-



MOSES AGAIN STRETCHED HIS HAND
OVER THE WATERS

manded to lift up his rod and stretch out his hand over the sea. As he did so a

strong east wind came up and blew all night, and the water of the sea swept back so that a dry path was left for the people to walk upon. And in the morning they walked across the path with a wall of water on the right of them and one on the left, and all came safely to shore on the other side.

When the Egyptians discovered that the Israelites had escaped them they followed them eagerly, but the wheels of their chariots came off, and they could not go fast. While they were on the path in the sea Moses again stretched his hand over the waters, and the waters that were piled up on either side came together. Then all of Pharaoh's army perished. On the other side of the Red Sea were the Israelites, and when they saw how they had been delivered they sang a song of thanksgiving, which began, "I will sing unto the Lord, for he hath triumphed gloriously; the horse and rider hath he thrown into the sea." Thus were the descendants of Jacob delivered from the land of bondage, after they had suffered in Egypt for many long years.

THE ISRAELITES ENTER THE PROMISED LAND

After the Children of Israel escaped from their bondage in the land of Egypt, they wandered for forty years in the Wilderness between the Red Sea and the Jordan River. Before they passed over the river into the Promised Land of Canaan, Moses, their devoted leader, died, but God chose a new guide for them—Joshua, the son of Nun—and they were not left leaderless. As the people came near to the boundaries of Canaan, Joshua sent two men ahead to view the country they were to occupy. These men crossed over the Jordan and went into the city of Jericho, which was the first place the Israelites were to capture. There they found refuge in the home of a woman named Rahab. It happened that someone told the king of Jericho that two spies from the Israelites were hidden in Rahab's house, and he sent word to the woman to deliver them up. But she took them up to the roof of her house, and hid

them under some stalks of flax which were spread out to dry. And when the king's messengers came to take the spies away they could find no one. After the messengers had departed Rahab went up to the roof and told the men what she had done. She said she knew that the Children of Israel were about to take possession of Jericho, and she begged them to remember her kindness when their soldiers entered the place. The spies answered her kindly and suggested that she fasten a scarlet thread in the window of her house, so that when the Israelites came to take the city they would know which house was hers.

Jericho, like many other ancient cities, was surrounded by a wall. Rahab's house was built close to the wall and had a window overlooking it. It was therefore an easy matter for her to let down a rope from the window and help the two men to escape; for the gates of the city were

shut and locked by the king's servants, and the spies could not go out in the usual way. Then, following Rahab's advice, they hid in the mountains for three days, to wait until the search for them had ceased. And at the end of that time they



THE RETURN OF THE SPIES

crossed the Jordan and reported to Joshua in the camp of Israel.

Early one morning Joshua and his people marched to the banks of the Jordan and camped there for three days. On the morning of the fourth day they began to march across the river, with the priests

at the head carrying the Ark of the Covenant. And as soon as the feet of the priests touched the water it parted before them, and they walked out on dry ground into the middle of the stream. There they stood with the Ark, waiting until the people had all passed over to the opposite shore, and after the passage had been made the waters flowed together again. The Israelites were now in the land of Canaan, not far from the city of Jericho, which the Lord desired they should possess.

God revealed to Joshua that the city was to be captured after seven days, and this is how they took possession of it: Once a day for six days the soldiers marched around the city, and marching with them were priests carrying the Ark. In front of these were other priests bearing trumpets made of ram's horns. On the seventh day they marched around the city seven times, but the last time the priests blew a loud blast on their trumpets and the people uttered a great shout, and at the sound the walls of Jericho fell down. Then the Israelites entered and took possession, but not one person was harmed in the house which had the scarlet thread in the window. Thus, after many years of hardship, the Children of Israel established themselves in the land which God had promised to the descendants of Abraham, hundreds of years before. And in the course of time God raised up men to rule over them who were called judges.

RUTH AND NAOMI

A Story of Loyalty

In the days when Israel was ruled by judges there lived in the city of Bethlehem a man named Elimelech. During a period of famine he and his wife, Naomi, and their two sons departed from their home and journeyed eastward to the land of Moab, beyond the Jordan River and the Dead Sea. After they had settled in their new home Elimelech died, but his two sons married women of the land of Moab, and they and Naomi remained in the country for about ten years. Then trouble came, for both of the sons died. In her loneli-

ness and grief Naomi turned her thoughts to her old home, where there was again food in abundance. So one day she and her two daughters-in-law Orpah and Ruth, started for Bethlehem. Before they had passed over the border of Moab, however, Naomi suggested to her companions that they turn back. She pictured to them the loneliness awaiting them in a strange country, and urged them to return before it was too late. As they talked and wept together Orpah decided to return to her people, but Ruth could not be persuaded to desert her old mother-in-law. In an-

swer to Naomi's words she said, "Entreat me not to leave thee, or to return from following after thee: for whither thou goest I will go; and where thou lodgest, I will lodge: thy people shall be my people, and thy God my God."

So Naomi and Ruth journeyed on together and came finally to the home in



RUTH AND NAOMI

Bethlehem. There was much excitement among the neighbors when they saw Naomi, but when they questioned her she told them not to call her Naomi, but Mara, which means bitter. She meant that the Lord had dealt very bitterly with her, for she had lost her husband and her two sons. It was truly a sad homecoming. In those days it was the custom for the poor to go

into the harvest fields and pick up the grain which the reapers left behind them. When Naomi and Ruth arrived at Bethlehem it was just at the time of the barley harvest, and Ruth suggested that she go into the fields to glean, that they might have food to eat. Naomi gave her consent, and it happened that Ruth gleaned in the field owned by a rich kinsman of Elimelech, a man by the name of Boaz. When, as was his custom, he came into the field to watch his reapers, he noticed the strange young woman, and inquired who she was. The chief servant related her story, and Boaz was deeply moved by her loyalty to the lonely mother-in-law. He spoke very kindly to her, telling her to continue to glean in his field, and promising that no harm should come to her. At meal time they sat side by side, and Boaz gave her parched corn to eat. When she returned to her work he told his reapers to let some handfuls of grain fall on purpose for her.

Naomi was made very happy that evening when Ruth came home with a goodly supply of grain, and described the great kindness of Boaz. She told her daughter that their benefactor was one of their kindred, and that she must do all that he said. So Ruth returned to the field of Boaz and gleaned there until the end of the harvest. When the harvest was over Boaz asked her to be his wife, and a happy marriage was the reward of her faithfulness. In time a little son was born to her. In this new life none was happier than Naomi, especially when she became the nurse of the baby boy, whom they called Obed. It is interesting to know that years later Obed became the father of Jesse, whose son David was one of Israel's kings.

THE STORY OF SAMUEL

A Boy Who Was Obedient

When Eli was the high priest at the tabernacle in Shiloh, he noticed one day that a woman, who was much troubled, came to the place to pray. She wept as she prayed, but she spoke so softly he could not understand her. At first he thought she had been drinking too much wine and he rebuked her, but when she

told him that she was sorrowing because of a blessing denied her, he told her to go in peace, and assured her that God would answer her prayer. Then she returned to her home in Ramah, greatly comforted. This woman's name was Hannah. She was the wife of a good man named Elkanah, and she was grieving because she had no children. When she

prayed in the tabernacle she made a vow that if a son came to her she would consecrate him to the service of the Lord. In the course of time her prayer was answered, and a baby boy was born to her, whom she named Samuel. As soon as he was old enough Hannah and Elkanah brought the child to the tabernacle and showed him to Eli. "I am the woman that prayed here," she said, "and this child is the blessing I asked for. Therefore I have given him back to the Lord, and he shall belong to the Lord as long as he lives." So she left him there and every year she visited him and brought him a new coat.

Little Samuel was very happy in his life at the tabernacle, and he became a great help and comfort to Eli, who was growing old. Eli had two sons who were priests in the tabernacle, but they were not good men, like their father, and their evil ways kept people from the house of worship. Eli rebuked them, but he did not take any steps to punish them, nor did he put good priests in their place. One night after Samuel had gone to bed he heard a voice calling, "Samuel." At once he answered, "Here am I," and ran to Eli to see what he wanted. But Eli said, "I did not call. Lie down again." Again the boy heard a voice calling him, and once more ran to Eli. But the high priest answered as before, "I called not, my son; lie down again." A third time Samuel heard the voice, and again he ran to Eli, saying, "Here am I, for thou didst call me." Then Eli knew that it was the voice of the Lord speaking to the child. So he said to him, "Go, lie down; and if He call thee, say, 'Speak, Lord, for Thy servant heareth.'"

Samuel returned to his bed, and when he heard the voice he cried out, "Speak, for Thy servant heareth." Then there was revealed to him something that must have made him feel very sad. He was told that the Lord was going to do a thing which would make everyone who should hear of it afraid; that he would punish Eli and his sons, because the sons were wicked and their father had not kept them from their evil ways. In the morning

Samuel rose up and opened the doors of the tabernacle, as was his custom, but he dreaded to meet Eli and disclose what he had heard. The high priest, however, called him at once, and said, "Samuel, my son, what is the thing that the Lord hath said unto thee? I pray thee hide it not from me." Then Samuel told him every word, keeping nothing back. Eli realized that he deserved God's displeasure, and he said, "It is the Lord! let Him do what seemeth Him good."

Some time after this the Israelites were defeated in a great battle with their bitter enemies, the Philistines. When the soldiers came back to their camp, the chief men began to ask why this disaster had come upon them. Then they decided to have the precious Ark of the Covenant, which contained the Tables of the Law, brought to the camp from the tabernacle at Shiloh. "For," they said, "when it is among us it may save us from our enemies." Now, this was a wrong thing to do, because they did not wait for guidance from God in the matter. They sent to Shiloh for the Ark at once, and it was carried to the camp by the sons of Eli. When the people saw it they shouted for joy, so that the Philistines heard the noise in their own camp, and asked the reason for the uproar. The news that their enemy had taken the holy Ark into the camp did not discourage the Philistines, however, and that day they defeated the Israelites in another great battle and took from them the Ark. Among those slain in the battle were the sons of Eli.

When the battle was over a messenger ran from the camp of Israel to Shiloh, to carry to the people the terrible news; as was customary in those days, he showed his grief by tearing his garments and putting earth on his head. Now as Eli was sitting upon a seat by the wayside, waiting for news of the Ark, he heard a great tumult in the city. This was the cry of despair that went up from the people when the messenger told them that the battle was lost and the Ark captured. Then as Eli turned his sightless eyes toward the city, the man came running

up and broke the news to him. The aged priest could bear to hear tidings of the defeat of the army and the death of his sons, but when he learned of the fate of the Ark he fell from his seat and was killed. Thus was fulfilled the prophecy that Samuel had heard in the night.

Samuel, all this time, had been growing and increasing in knowledge and goodness, and when Eli died he became judge over all the people. The Ark was restored

to the Israelites after seven months, but was not brought back to the tabernacle at Shiloh. Samuel returned to Ramah, his birthplace, and made that his home, and he built an altar there and offered up sacrifices. He was the last of the judges of Israel, for in his old age the people demanded that their next ruler should bear the title of king. And Samuel later anointed Saul to be the first king of Israel.

DAVID AND JONATHAN

A Story of Friendship

The story of David and Jonathan belongs to that period when the Israelites had come under the rule of a king. David was the youngest son of Jesse, a rich sheep owner of Bethlehem, and Jonathan was the son and heir of Saul, the king of Israel. When we first hear of David he was a strong, manly lad of about sixteen, with reddish hair and a countenance "very goodly to look upon." One day, while he was engaged in his daily task of guarding his father's flocks, he was visited by messengers of King Saul. Now, the king at times would fall into moods of deep melancholy, and he had asked his servants to find someone who would drive away his brooding by playing upon the harp. One of the attendants said that he knew of a skilled harpist, and the king sent his messengers to bid him come to court. This harpist was none other than the boy shepherd of Bethlehem, and so it came to pass that he found himself in the court of a king. Saul was delighted with the comely lad, and he received refreshment and healing in listening to his playing.

Not long after David was brought to court the Israelites were threatened by a neighboring people, the Philistines. Saul gathered together an army to fight them, but his youthful harpist returned home to take up again his duties as tender of his father's sheep. Three of David's brothers entered the army of Israel, and one day Jesse, their father, sent his youngest son to the camp with food for them. He found the Israelites sorely terrified

by a great champion of the Philistines—a giant named Goliath—who daily strutted before the soldiers of Saul and dared them to send a champion against him. Not one of the king's warriors had the



DAVID PLAYING BEFORE SAUL

courage to accept his challenge, and it was therefore with amazement that Saul heard David asking that he himself be permitted to fight the giant. "Thou art but a youth," said the king. But David persisted, and, refusing to put on the helmet and coat of mail that Saul offered him, he went out to battle armed with a sling and five smooth pebbles. Eagerly he ran forward to meet the Philistine, who scoffed at him and ridiculed his ap-

pearance, but the first stone hurled from his sling smote the giant in the forehead and killed him. And when the Philistines saw that their champion was dead they fled in dismay.

Of course this astonishing deed made David a great hero. He was brought again before the king, and we can imagine the wonder in Saul's voice as he questioned this mild-faced lad whom he knew only as a gentle harpist. David's modest bearing and his simple reply to Saul's question as to who he was, "I am the son of thy servant Jesse, the Bethlehemite," deeply impressed one person who listened to the conversation. This was Jonathan, the king's son. When the interview was over "Jonathan's soul was knit with the soul of David, and he loved him as his own soul." Then there began a beautiful friendship between the young men. And as was the custom in those days, Jonathan gave to David his royal robe, his sword, his girdle and his bow. Saul then made David one of his generals.

The story of Jonathan's loyalty to his friend is one we all love to think about. The young prince was everything that a king's son should be—strong, brave, handsome and generous. He was true to David at the price of arousing his father's bitter anger, for as time passed by Saul grew very jealous of David, and his ill-will increased until he determined to kill him. At last David was forced to flee for his life. One day he met Jonathan in a secret place, and the two talked together long and earnestly. Jonathan had tried to bring about a reconciliation and to pacify his father, but David could not believe the king had given up his evil plans. "I will absent myself from the king's table at the feast of the new moon," he said, "and when he asks about me tell him that I have gone to Bethlehem to attend a sacrifice. Thou wilt know from his manner of receiving this news whether my life is still in danger." Then the friends agreed that at the end of three days David should conceal himself by the stone of Ezel, and that Jonathan should go into the field and shoot three arrows.

Then he would send a lad to find the arrows and would say to the boy, "Behold, the arrows are on this side of thee," or "Behold, the arrows are beyond thee." If David heard the words *beyond thee* he was to know that the king still sought to kill him.

On the day following the new moon Saul inquired of Jonathan where David was. When he heard Jonathan's reply he turned on his son savagely, warning him that so long as David was alive their right to the throne was in peril. In shame and sorrow the young man left his father, and on the morning of the next day he went to keep his appointment with his friend. To him, simple faith was more precious than a royal throne. And when David saw the arrows fall and heard the words which had been agreed upon, he knew that his life was still in danger, and, creeping from his hiding place, he fell on his face before his friend. Then the two young men wept and bade each other a tender farewell.

One other meeting is recorded. This took place sometime later, on a wooded hill about three miles south of Hebron, where David had intrenched himself with a small army of devoted followers. Though Saul's army had almost surrounded the hill, Jonathan succeeded in reaching his friend, and in giving him sorely needed words of comfort. He told him to have no fear, that Saul would not succeed in his plots, and that the next king of Israel would be named David, and not Jonathan. This was the last time the friends saw each other. Jonathan, loyal to Israel to the last, fell in battle on the field of Gilboa, in a fight against the Philistines. And when David heard of his death he uttered this beautiful lament:

The beauty of Israel is slain upon thy high places; how are the mighty fallen!

"How are the mighty fallen in the midst of the battle. O Jonathan, thou wast slain in thine high places.

"I am distressed for thee, my brother Jonathan. Very pleasant hast thou been unto me: thy love to me was wonderful, passing the love of women.

How are the mighty fallen, and the weapons of war perished.

STORIES OF THE PROPHET ELIJAH

During the reign of Solomon, son of David, the Children of Israel grew dissatisfied and unhappy because they were heavily taxed and harshly treated. Therefore, when Solomon died and his son Rehoboam came to the throne, the people demanded that their new king show them greater kindness than his father had done. But Rehoboam answered them roughly and told them that whereas his father had chastised them with whips, he would chastise them with scorpions. By this he meant that he would add to their burdens and outdo his father in cruelty. Thus it came to pass that a part of the Children of Israel rebelled, and ten of the tribes set up a separate kingdom in the northern part of the country, under Jeroboam. This king did many evil things, and the kings who followed him were as wicked as he. But Ahab, seventh king of Israel, was more wicked than all the others, for he married a heathen woman, Jezebel, and openly set up in the kingdom the worship of the god Baal. He even built a temple for this idol in the city of Samaria, which was the capital of the ten tribes.

Then God raised up the prophet Elijah to rebuke the king and to teach the people how to live righteously. One day Elijah went before Ahab and said, "As the Lord God of Israel liveth, before whom I stand, there shall not be dew nor rain in the land of Israel until the Lord commands me to ask for it." These words made the king very angry, and it was revealed to Elijah that he should flee away where Ahab could not find him. "Go," the Lord said, "and hide thyself by the brook Cherith, which flows into the Jordan. Thou shalt drink of the water of the brook, and I have commanded the ravens to feed thee there." So Elijah did as he was told, and he stayed by the brook for some time. Every morning and every evening the ravens brought him meat and bread to eat, and he drank every day from the water in the brook.

Now all this time there was no rain in the land, as Elijah had foretold, and before very long the water in the brook

dried up. Then the Lord commanded Elijah to go to a city called Zarephath; in that place, he was told, a woman who was a widow would feed him. When the prophet arrived at the gate of the city he saw the woman gathering sticks, and he said to her, "Give me, I pray thee, a little water to drink." As she was about to go for the water he added, "Bring me, too, a piece of bread to eat." Then the woman told him that she was very poor, and had nothing in the house but a handful of meal in a barrel and a little oil in a cruse, or flask. "I am gathering sticks now," she said, "that I may go home and bake a cake for me and my son. After that we must starve to death." But Elijah told her to have no fears, for after she had baked a cake for him and one for herself and son, there would still be meal in the barrel and oil in the cruse. The woman did as he told her, and it came to pass that as long as the famine lasted the meal in the barrel and the oil in the cruse became no less.

After there had been more than three years of famine, it was revealed to Elijah that he was to go to King Ahab and tell him that rain would be sent again to the suffering land. On his way home he met the king's chief servant, Obadiah, who was wandering about in search of pasturage for the horses and mules that were still alive. And he told Obadiah to go to King Ahab and say that Elijah had come. When the king and prophet met Ahab rebuked Elijah for troubling the people of Israel, but Elijah told him that the famine was sent as a punishment because of their worship of Baal. Then Elijah proposed a test to show which was the true God, whether it was Baal or the God whom the prophet worshiped. And he told Ahab to have all the people gather at Mount Carmel and to bring there the four hundred and fifty prophets of Baal. When they had all gathered at the mountain Elijah called out to the people, "How long will ye be in deciding whom ye will serve?" But the people answered not a word.

After this he had the prophets of Baal kill a bullock and lay it on an altar, and

they placed wood on the altar ready for burning. But they were not permitted to put any fire under it. Instead, Elijah told them to pray to Baal to send down fire from heaven to consume the offering. Then the prophets cried out to their idol from morning until noon, but no fire came down from heaven to burn up their offering. And Elijah mocked them, saying, "Call louder upon your god; he may be talking to someone, or perhaps he is asleep and must be wakened." But though they called out until evening, there came no answer.

Then Elijah told the people to come close to him. And he took twelve stones and built up the altar of the Lord which had been broken down, and he dug a

trench around it. Then he laid wood on the altar and made a bullock ready for the sacrifice, and he had the people pour barrels of water over the sacrifice until it ran down and filled the trench. It was now evening, and just at the hour when the priests were accustomed to offer up a lamb in the temple. Elijah prayed to God, asking that the people might be shown who was the true God. Then fire fell down from heaven upon the altar. It burned up the bullock and the wood, and even the stones of which the altar was made, and it licked up the water in the trench.

When the people saw this wonder they bowed down on the ground and cried, "Thy Lord, he is God."

THE HEALING OF THE SYRIAN CAPTAIN

After Elijah's work was finished Elisha prophesied in his place. In those days the Syrians invaded Israel and carried away into captivity a little girl who was made a servant of the wife of Naaman. Now Naaman was the captain of the Syrian army, and he was greatly honored by the king for his bravery. Yet he had one trouble that kept him from enjoying all this honor: he suffered from the terrible disease of leprosy. The little captive maid in his household knew about his trouble, and one day she said to her mistress, "If my master will go to see the prophet that lives in Samaria, he will cure him of his leprosy." When the king heard of this he said to Naaman, "Thou shalt go to Samaria, and I will give thee a letter to the king of Israel who lives there."

Soon afterwards Naaman departed with money and costly garments, which he intended to give to the man who cured him. On arriving at Samaria he proceeded to the palace of Jehoram, king of Israel, and delivered to him the letter written by the king of Syria. And when Jehoram read the words—"I have sent Naaman, my servant, to thee, that thou mayest cure him of his leprosy"—he was greatly troubled. For he knew of no cure of leprosy, and he feared that the king of Syria was seek-

ing an excuse to quarrel with him. This matter was reported to Elisha, the prophet, and he sent word to Jehoram to have no fear. "Let the man come now to me," ran his message, "and he shall know that there is indeed a prophet in Israel."

Then Naaman went to the house of Elisha and stood before the door. And the prophet sent out a messenger who said, "Go, wash seven times in the River Jordan, and thou shalt be made well." This message greatly vexed Naaman, for he had expected that the prophet would come out and pray for him, and put his hand on him. Said he, "Are not the rivers in my own country better than all the rivers in the land of Israel? Could I not wash in them and be cured?" As he was departing in anger his servants came up to him and said, "Master, if the prophet had told thee to do some great thing wouldst thou not have done it? Is it not better to do as he bids thee when thou hast only to wash in the river?"

Then Naaman, heeding the counsel of his servants, dipped himself seven times in the Jordan River, and the dreadful disease left him and his skin became as rosy and clean as that of a child. Then he and all his company returned to the house of Elisha, and Naaman said to the prophet, "Now I know there is no other God in all

the earth but the God of Israel." He offered Elisha gifts of raiment and money, but Elisha could not be persuaded to accept anything, for he wished God to have all the glory for the healing of the lep-

rosy. And this is how a great captain of the Syrians was brought to acknowledge the God of Israel through the words of a little captive maid, who was guided by the impulse to be kind.

STORIES OF DANIEL

Loyalty to Principle

When Nebuchadnezzar reigned as king of Babylon he captured the city of Jerusalem and carried away into captivity large numbers of Jews. While he was in Jerusalem this king commanded his chief officer to select a number of captive youths, who were to be given special instruction for three years and be trained for service in the royal palace. None should be chosen, the king ordered, who had any faults, but only such as were young and attractive, and quick to learn. Among those selected was a boy named Daniel. He had been carefully trained in the religion of his forefathers, and when he was brought to Babylon he resolved that he would not forget his early teachings.

Now King Nebuchadnezzar had ordered that the captive children should be given meat to eat and wine to drink from his own table, for he wished to have them well nourished. The people of Babylon, who were called Chaldeans, worshiped idols and offered up sacrifices of animals and made offerings of wine to them, and they ate the flesh of animals and drank the wine. So Daniel decided that it would be a sinful thing for him to eat meat and drink wine used for such purposes, and he asked the chief officer to excuse him and three special companions of his from partaking of that food. The officer was fond of the lad, but he dared not disobey the king, for he knew he would be very angry if the young captives should appear pale and thin. So the youths were given over to the care of the steward, who had orders to serve them meat and wine.

Then Daniel said to the steward, "Try us, I pray thee, ten days, and give us only vegetables to eat and water to drink. At the end of that time compare our faces with those of the young people who have eaten of the king's food, and if we do not

look as well as they, then give us whatsoever thou thinkest best." The steward consented to make this test, and at the end of the ten days their faces were fatter and their skin clearer than the faces and skin of those who had eaten meat and drunk wine. So Daniel and his three friends continued to eat vegetable food and to drink water, and when, at the end of three years, they came before the king, they were found superior to all the other captives, both in looks and in knowledge and understanding.

The Interpretation of the King's Dream

One night Nebuchadnezzar had a dream that troubled him greatly. When he awoke he could not remember it, and so he called his wise men together and told them that they must not only recall the dream to his mind, but explain what it meant. The wise men protested that no man on earth could bring back a forgotten dream, but they said they would interpret the dream if the king would tell it to them. Then Nebuchadnezzar grew very angry and ordered all the wise men of Babylon to be killed. Now, Daniel was reckoned as one of the wise men, and when the news of the decree was brought to him he went into the palace and entreated the king to give him more time. He promised Nebuchadnezzar that he would reveal the meaning of the dream, and the king promised to give him the time he asked for.

Now this was the dream that Daniel recalled for Nebuchadnezzar. He said: "Thou sawest in thy dream, O king, a great image. The form of it was terrible, and it shone with exceeding brightness as it stood before thee. Its head was made of fine gold, its breast and arms were of silver, the rest of its body was of brass; its legs were of iron, and its feet were part

of iron and part of clay. As thou beheld it there came a stone cut out of a mountain, that struck the image upon its feet and broke them to pieces. Then the image fell, and the iron, the brass, the silver, the gold and the clay were all broken up together by the stone, into pieces as small as the dust which is left on the threshing floor after the farmer has been threshing his grain; and the wind blew them away, no one could tell where. Afterward the stone that had broken the image grew to be a great mountain and filled all the earth."

Then Daniel told the king that his dream was a warning of things to come. The gold, the silver, the brass, the iron and the clay, he said, all meant different kingdoms. The head of gold meant Nebuchadnezzar himself, because he was greater than all the other kings. After he died, new kingdoms would arise, and these were typified by the silver, the brass, the iron and the clay. Last of all the Lord would set up a kingdom which never would be destroyed, but which would break in pieces all the kingdoms that were before it, just as the stone had broken the image. This stone typified the kingdom of Christ. When Daniel finished speaking the king fell on his face before him and acknowledged the power of the true God. And afterwards he made Daniel ruler over the province of Babylon and chief of all his wise men.

The Handwriting on the Wall

After many years Nebuchadnezzar died, and his son Belshazzar reigned in Babylon. One night Belshazzar gave a royal banquet for a thousand of his lords. They drank wine out of gold and silver vessels which had been taken out of the temple in Jerusalem, and they feasted and joined in noisy revelry. While they were making merry there suddenly appeared on the wall of the banquet room a man's hand, which wrote words in a language no one understood. As the king watched the mysterious hand he grew pale with fear, and he trembled until his knees knocked against each other. Then he cried aloud to his servants, bidding them bring in his

wise men. To them he said, "Whoever shall read this writing and interpret it shall be clothed in scarlet and have a chain of gold about his neck, and shall be the third ruler in the kingdom." But not one of the wise men could read the mysterious writing.

This matter was made known to the queen, and she came in before the king and said, "Be not troubled, O King. There is a man in the kingdom who has the wisdom and understanding of the gods, and was made chief of all the wise men by thy father, Nebuchadnezzar. Let this man Daniel be called; he will give the interpretation." When Daniel was called in before the king, Belshazzar said to him, "Art thou that Daniel who was brought captive with the Children of Israel, out of Judah? I have heard of thy wisdom and understanding, and am told that thou canst interpret secret things. Read and interpret this writing for me and thou shalt be clothed in scarlet and have a chain of gold about thy neck." But Daniel answered, "Keep thy gifts for thyself and give thy rewards to another. I will read and interpret the writing for the king."

Then he reminded Belshazzar of the pomp and glory that had been Nebuchadnezzar's and recalled how he had forgotten the true God and lost all his kingly glory. And he continued, "Thou, his son, hast not humbled thine heart, but hast been proud and sinful. Behold the golden vessels of the temple of God, which thou and thy lords have filled with wine. Because thou hast done these things and hast honored idols of wood and stone, God hath sent this writing, and these are the words of it: Mene, Mene, Tekel, Upharsin. And the interpretation is—God hath numbered thy kingdom and finished it. Thou art weighed in the balances and art found wanting. Thy kingdom is given to the Medes and Persians." When Daniel had finished speaking the king ordered him to be clothed in scarlet, and he made a decree that he should be the third ruler in the kingdom. But that same night Babylon was stormed by the Medes and Persians and Belshazzar was

slain. Then the kingdom was taken over by Darius, the Mede.

In the Lion's Den

After Darius became king he chose one hundred and twenty princes to govern the kingdom. Over these he set three presidents, and he made Daniel the chief of the presidents because he trusted and admired him. But the other presidents and the ruling princes grew jealous of Daniel because of the greater honor given him, and they plotted against him. When they found that they could bring the king no evil report of him, they remembered that he worshiped the God of the Jews, and they decided to use this against him. So they said to the king, "King Darius, live forever. All the chief men of thy kingdom have consulted together, and want a law made that whosoever asks help of any god or man, for thirty days, other than of thee, O king, shall be cast into a den of lions. Now, O king put this law

in prayer in his own room three times a day. He always prayed with the windows opened toward Jerusalem, and so this habit was known to everybody. When he heard of the decree he went as usual to his room, and prayed openly, as was his custom. No sooner did his enemies see him in this act than they hastened to the king and reminded him of the decree he had signed. But when they told him that Daniel had disregarded the law by praying to his own God, Darius was very much displeased with himself for having signed such a law. He labored all the rest of the day, till sundown, to find a way to deliver his trusted servant, but it was not possible even for a king to change a law of the Medes and Persians.

Then at last he gave the order to have his servant cast into the den of lions, but as Daniel was led away the king said to him, "Thy God, whom thou servest continually, he will deliver thee." Then Darius returned sorrowfully to his palace and spent the night in fasting. Early in the morning he hastened to the den of lions and called out fearfully, "O Daniel, thou servant of the living God, is thy God able to deliver thee from the lions?" And to his great joy he heard a voice saying, "O king, live forever. My God has sent his angel and shut the lions' mouths so that they have not harmed me. For I have not sinned against my God, nor have I done wrong to thee, O king." Then the happy king ordered the captive released, and they found him unhurt. After this Darius made a new decree that men in every part of the kingdom should honor the God of Daniel. And Daniel prospered in the reign of Darius, and in the reign of Cyrus, who followed him.

It is recorded of Cyrus that he, too, was pleased with Daniel, and not only treated him liberally, but all the Hebrews who were in captivity. In the first year of his reign he issued a proclamation providing for the return of the people to Jerusalem to rebuild their Temple. Cyrus also restored to the Hebrews the beautiful gold and silver vessels which years before King Nebuchadnezzar had wrongfully taken from the Temple.



THE LIONS' MOUTHS WERE CLOSED

into writing and sign it, so that it cannot be changed; for the laws of the Medes and Persians never change." Seeing then no objection to the decree, Darius had the law written, and he signed it.

Now it was Daniel's custom to kneel

ESTHER, THE BEAUTIFUL QUEEN

In the third year of his reign, Ahasuerus, king of Persia, gave a magnificent feast for his nobles and attendants, in the garden of the royal palace of Shushan. At the same time the king's wife, Vashti, gave her friends a feast, in the women's part of the palace. On the seventh day, when the king had drunk much wine and was feeling merry, he ordered his queen to appear before his guests, that they might see how beautiful she was. But Vashti did not care to display her beauty in this manner, and she refused to obey his husband.

Ahasuerus was very angry, and he said to his wise men. "What shall we do to Queen Vashti, because she has not obeyed the commandment of the king?" One of the wise men answered, "Vashti has wronged not only the king but all the princes and all the people in the kingdom; for if the women hear that the queen refuses to obey the king, they will no longer obey their husbands. Therefore, O king, make a decree that Vashti shall come no more before thee, and let this decree be known to all the people, that the wives throughout the land may know that they must obey their husbands." This advice pleased the king very much, and he had the decree published throughout the length and breadth of the land. Then the royal servants came to their master, saying, "Let the king send officers to all the provinces of the kingdom, that they may gather together all the beautiful young women of Persia into the palace at Shushan. And let the one who pleases the king best be queen instead of Vashti." This advice, too, pleased the king, and he ordered the thing done.

Among the servants in the palace there was a Jew by the name of Mordecai. He belonged to the tribe of Benjamin, and had been carried away into captivity from Jerusalem, many years before. This good man had brought up as his own child an orphan girl named Esther, the daughter of one of his uncles. At the time of our story Esther was a young woman, and she was as good as she was beautiful. In ac-

cordance with the king's commandment young maidens were brought to the palace and Esther was among them. Her beauty was noticed by the king's officer, and he treated her very kindly, giving her maids to wait on her, and placing her in the best part of the palace. And until it was time for Esther to go before the king, Mordecai walked every day before the court of the women's quarters, to find out how his beautiful cousin was faring. At last she was brought before the king. As soon as Ahasuerus saw her he knew that he loved her, and he set the royal crown upon her head, and made her his queen in place of Vashti.

Soon after Esther became queen two of the king's officers plotted to kill the king. Mordecai, who was a watchman at the palace gate, overheard what they said, and told Esther. She warned the king, and so saved his life. And what Mordecai had done was written down in a book.

Among the servants in the palace was a man named Haman. He won the favor of King Ahasuerus, and was exalted above all the noblemen and attendants at the court. The king's servants who watched at the gate were commanded to bow down to Haman, and everyone obeyed this order except Mordecai. When the other servants told Haman of Mordecai's defiance he formed a plot to kill all the Jews in the kingdom, for the servants reported that Mordecai was one of that race. First he tried to poison the king's mind by speaking ill of the Jews. He said that they had laws of their own, and would not obey the laws of Persia. The king listened to what Haman said, and gave him a ring which he used in sealing his writing whenever he made a decree. By this he meant that Haman could issue a decree against the Jews and could seal it with the ring; in this way it would have the king's sanction. Haman therefore had a decree written that on the thirteenth day of the twelfth month the people of Persia should kill all the Jews in the kingdom, from the oldest to the youngest. This cruel decree was

sealed with the king's ring, and copies of it were sent by messengers to the rulers of all the provinces in Persia.

As soon as Mordecai heard the dreadful news he rent his clothes and put on sackcloth, which was a token of bitter sorrow. And all through the land there was mourning among the Jews, and fasting and crying. Queen Esther knew nothing of the decree, but her maids told her that Mordecai was mourning bitterly and had put on sackcloth, and she sent one of the servants to find why he sorrowed. Mordecai told the servant all that had taken place, and he gave him a copy of the decree to show to Esther. He begged him also to ask the queen to intercede for the Jews before the king.

Then Esther, when she received the message, sent the servant back to Mordecai with this reply: "Whoever goes into the inner court of the king without being called is liable to be put to death. Such a one is saved only when the king holds out his golden sceptre. I have not been called to come in unto the king for thirty days." But Mordecai returned this answer: "Think not that thou shalt escape any more than the other Jews. For if thou wilt not try to save thy people at this time, some one else will save them, but thou and thy relations shalt be destroyed. Who knows but that thou hast been made queen for the express purpose of delivering thy people?" Then Esther hesitated no longer, but sent word to Mordecai to gather the Jews in the city together, and have them fast for three days. "I and my maidens also will fast," she said, "and then will I go unto the king. And if I perish, I perish."

At the end of three days Esther dressed herself in royal robes and went into the inner court and stood where the king, seated on his throne, could see her. When he looked at her he felt kindly towards her, and held out the golden sceptre. So she drew near and touched the top of the sceptre. Then the king said, "What is it thou desirest, Queen Esther? It shall be given thee even unto half of my kingdom." She answered, "If the king be willing I want the king and Haman to

come to-day to a banquet which I have made ready." Then Ahasuerus at once sent word to Haman to make haste to come to the queen's banquet. When they were at the table the king asked Esther what thing she desired of him, for he knew that she had a wish still unuttered. But she answered, "My desire is that the king and Haman come to another banquet to-morrow. Then I will tell the king what it is I would ask of him."

As Haman left the banquet room he felt very proud and happy to be so honored, but when he saw Mordecai, as he passed through the palace gate, he burned with indignation. For the Jew gave no sign that he saw him. At home that day he boasted to his wife and friends of his riches and honors. Yet he told them that even an invitation to the queen's banquet did not console him when he remembered the Jew sitting at the gate. So his wife and friends said, "Let a gallows be made fifty cubits high, and to-morrow ask the king to have Mordecai hanged upon it." This idea pleased Haman very much, and he ordered the gallows to be built at once.

That night the king was restless and could not sleep, and he had his servants read to him out of the book of records. When they came to the part which described the loyalty of Mordecai in reporting the plot to kill the king, Ahasuerus said, "What honor has been done to Mordecai, because he did this service for me?" They answered, "Nothing has been done for him." While they were thus talking together, Haman came into the outer court. He was on his way to ask the king that Mordecai be hanged upon the gallows he had ordered built. When the servants told Ahasuerus that Haman waited outside to speak to him, he said, "Let him come in." As Haman stood before him, the king said, "What shall be done for the man whom the king desires greatly to honor?"

Then the boastful Haman thought to himself, "I am the man whom the king wishes to honor." But aloud he said, "Let the royal robes that the king wears, and the horse that he rides, and the crown

that is set on his head be brought to the man that the king loves to honor. Let him wear the robes and the crown, and let him ride upon the king's horse. And let one of the king's most noble princes lead the horse through the streets of the city, and cry out to all the people, 'Thus shall it be done to the man whom the king delighteth to honor!'



ESTHER BEFORE THE KING

When the king heard these words he said to Haman, "Make haste and take the robes and the horse and the crown, and do to Mordecai, the Jew, as thou hast said; leave nothing that thou has spoken undone." Though he was almost overcome with humiliation and disappointment by this command, Haman did not dare disobey his master, and he carried out his orders completely. But after he had led Mordecai's horse through the streets of the city he hastened home bowed down with shame and with his face covered. While he was telling his wife and friends what had taken place, a messenger came to bring him to the queen's banquet.

When they were at the table the king said, as before, "What is thy petition, Queen Esther? For it shall be given thee, even unto half of my kingdom." Esther

replied, "If the king be pleased with me this is my request, that the king will save my life, and save my people from destruction. For an enemy hath spoken against us, and we are to be slain." "Who is the man that hath dared to do these things?" cried the king. And Esther answered, "Our enemy is this wicked Haman." Then the king arose in great anger and hastened into the palace garden, but the frightened Haman bowed before the queen and begged her to save him. When the king returned to the banquet room one of his servants said, "A gallows fifty cubits high is ready by the house of Haman; he had it built for Mordecai, who saved the king's life." And Ahasuerus said, "Hang Haman upon it." So the wicked man died.

Then Esther told the king who Mordecai was, and of their kinship, and the king sent for him and gave him the ring with the seal. Haman's house had been presented to Esther, and she made Mordecai ruler over it. But the queen was still troubled, for the decree that the Jews must perish had not been recalled. Therefore she again presented herself before the king and again he held out to her the royal sceptre. Then she begged that the decree of Haman might be changed so that her people should not perish. In Persia in those times a law once published could not be changed, and Ahasuerus himself was unable to revoke the cruel decree. But he told Esther and Mordecai that they might issue a new decree giving the Jews the right to defend themselves. And it came to pass that on the thirteenth day of the twelfth month the Jews took their swords and defeated all who sought to kill them.

Thereafter two days of the twelfth month were observed by the Jews throughout the kingdom, as a memorial of the deliverance of the people. This month, they said, was the one in which their sorrow was turned to joy, and their mourning to gladness. All of these events were written down in the history of the kings of Media and Persia. For many years Mordecai was second only to King Ahasuerus, and held the highest place among the Jews.

BIBLIOGRAPHY, *bib li og'ra fi*. As most generally used, this term is used to describe a work which deals with the contents of books. In a wider sense it denotes writings about books in reference to the subjects discussed in them, their different degrees of rarity, reputed and real value, the materials of which they are composed and the rank which they ought to hold in the classification of a library. The subject is sometimes divided into *general*, *national* and *special* bibliography, according as it deals with books in general, with those of a particular country or with those on special subjects or of a special character, as early printed books or anonymous books. A general bibliography of all books that have ever been published is the unrealized dream of many scholars.

BIBLIOMANIA, a passion for collecting rare and curious books. Bibliomania has manifested itself to a remarkable extent during the last hundred years. With the bibliomania, or more properly *bibliophile*, the utility of a book is of secondary importance, while its rarity is the first, and sometimes only, requisite. First copies of books, scarce editions, the first publications of authors afterwards famous, and *editions de luxe* are among the treasures sought by the bibliophile. Books of the early printers, especially the Gutenberg, Caxton, Aldine and Elzevir books, bring enormous prices. A Bible, supposed to date from the year 1450, and to be one of the oldest printed books in existence, has been valued at \$50,000. There are many clubs of booklovers ("bibliomaniacs") in nearly all enlightened countries.

BIBLIOTHEQUE NATIONALE, *be ble o tek' nas yo nal'*, the French national library in Paris, the largest library on the continent. It contains over 2,600,000 printed volumes and maps, about 102,000 manuscripts, more than 300,000 engravings and 200,000 coins and cameos. The fact that there are so many printed volumes is due to the decree of 1536, that one copy of every book printed in France shall be deposited in the national library.

BICEPS, *bi'seps*, the large muscle in front of the arm, attached at its upper extremity to the scapula and at its lower, by a tendon, to the radius. By its action the elbow is bent, or if the elbow be made a fixed point the shoulder is moved, as may be seen in climbing a pole "hand over hand." The cor-

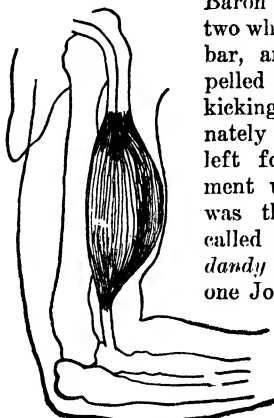
responding muscle on the back of the arm is called the triceps. See **MUSCLES**.

BICYCLE, *bi'sick'l*, a two-wheeled vehicle which can provide rapid transportation for one, two, three or four persons. When this machine was at the height of its popularity, about 1898, racing bicycles seating six persons were manufactured, but today only the single-seated model is popular.

A bicycle may be described as a light vehicle having two wheels, one directly behind the other, attached to a frame of steel, upon which a seat is mounted. It is propelled by the rider's feet, in contact with pedals. The earliest of the modern bicycles weighed as much as 150 pounds, and sold for about \$175; the best models of the present time weigh from twenty to thirty-five pounds; a good machine may be purchased for about \$25.

From about 1885 to 1895 millions of these machines were sold, and nearly all of them were used for pleasure. Their popularity waned suddenly; manufacturers declared this was because they ceased to advertise them, thinking the demand would continue without persuasion. The output declined nearly ninety per cent within a few years. After nearly three decades there came about renewed popularity of bicycling, and youths and adults of both sexes again found exhilaration in the pastime. The powered motorcycle developed from the bicycle.

The first bicycle was invented in 1816 and was known as the *draisine*, from its inventor, Baron von Drais. It had two wheels connected by a bar, and the rider propelled the machine by kicking the ground alternately with his right and left foot. An improvement upon the *draisine* was the *curricule*, also called *hobby horse* and *dandy horse*, invented by one Johnson of England.

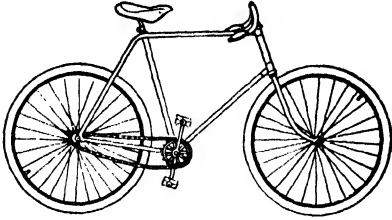


BICEPS

This was followed by the *velocipede*, which in form and principle of construction resem-

bled quite closely the modern bicycle, but the frame and wheels were of wood, the machine was propelled by the forward wheel and in

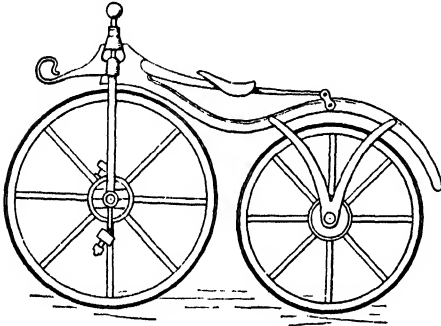
construction was somewhat clumsy. The velocipede was introduced into the United



MODERN SAFETY BICYCLE

States in 1866, and in the next three years velocipede-riding became very popular.

The velocipede gave way to the high bicycle or *ordinary*, which was introduced in 1873,



DANDY HORSE

and for about ten years was in general use in America and Europe, when it was displaced by the modern *safety bicycle*.

The bicycle industry is responsible for the development of many devices which have contributed to the successful operation of other mechanically-propelled vehicles. The *pneumatic tire* was invented to meet the need for a smooth-riding bicycle. The *ball-bearing* was perfected to its present stage for bicycles. The *differential axle* assembly so essential on motor cars was developed for use on tricycles. *Streamlining*, the most modern touch in motor-car body design, and for years used in airplane design, developed from the crouched position of early cyclists.

BIENNIALS, *bien'ialz*, in botany, a name given those plants which live practically for two years. The first season they sprout and bear leaves and roots, and the following spring or summer they produce flowers, seed and fruit. The intervening winter is a period of rest, in which nourishment is stored in the roots for the flowering period. Carrots, beets and turnips are

good examples of biennials, the roots in each case being an important food for man. Plants that live one year are called *annuals*, and those that live from year to year for an indefinite period are *perennials*. See articles under these headings.

BIENVILLE, *byaN veel'* JEAN BAPTISTE LE MOYNE, SIEUR DE (1680-1758), a French governor of Louisiana. He accompanied his brother Iberville in his explorations of the Mississippi and helped him to settle Biloxi in 1699. In 1700 he explored the country and erected a fort fifty-four miles above the mouth of the river, and in 1701 became director of the colony and removed its capital to Mobile, but was discharged from his office in 1707. A new colony having been formed by Law's Mississippi company, Bienville was made its governor; he founded the city of New Orleans in 1718 and transferred the capital of Louisiana to the new town in 1723. He was removed from his post on August 9, 1726, but in 1733 he was again made governor of Louisiana, with the rank of lieutenant-general. He published a code which prohibited every religion except the Roman Catholic and banished Jews from the colony; this remained in force until Louisiana was purchased by the United States.

BIERSTADT, *beer'staht*, ALBERT (1830-1902), a German painter, born in Dusseldorf, Germany. He came to America when a child. Though he studied art in Europe, he chose California and Colorado as the field for his work. His favorite subjects contained mountain scenery, and he painted Laramie Peak, Lander's Peak, Mount Hood and other peaks of the Rockies and the Sierra Nevada range with great success. Bierstadt was a member of the National Academy and of the Saint Petersburg Academy of Fine Arts.

BIG'AMY, a legal term signifying the crime of marrying a second time before the first marriage is dissolved. The Roman Catholic Church does not recognize divorce as valid, and communicants of that Church are not permitted to remarry even though the first marriage is legally dissolved. The civil law, however, in nearly all countries, takes the opposite view. In the United States any one convicted of bigamy is liable to penitentiary imprisonment for a term varying from two to five years. In England and Canada the minimum penalty is

two years' imprisonment at hard labor. See **POLYGAMY**; **DIVORCE**.

BIGELOW, *big'lo*, **POULTNEY** (1855-), an American historian and newspaper correspondent, born in New York. After study in America, France and Germany, where he became a personal friend of the German emperor, he was graduated at Yale and at the Columbia Law School. He practiced only a few years, however, and then began to travel extensively. He sailed around the world, was shipwrecked on the coast of Japan, visited China, Africa, the East and West Indies and made canoe trips over Europe. His journalistic experience includes his work as editor of *Outing*, which he founded, as London correspondent of *Harper's Weekly* and as Spanish-American War correspondent of the *London Times*. He has written *The Border Land of Czar and Kaiser*, investigation for which led to his expulsion from the Russian Empire; *A History of the German Struggle for Liberty*, *White Man's Africa*, and other works.

In 1905 Bigelow was severely criticized for publishing an unfavorable article on the Panama Canal, which government officials declared was based on insufficient information. His latest publication, *Genseric, King of the Vandals and First Prussian Kaiser* (1918), is a unique treatment of the personality of former Emperor William II.



ROCKY MOUNTAIN SHEEP

BIGHORN, the wild sheep of the Rocky Mountains, named from the size of its horns,

which are three and a half feet long, the animal itself being of the same height at the shoulder. It is grayish-brown, with a lighter face, and has a whitish patch on the rump and a dark line running along the spine. These animals go in herds of twenty or thirty, frequenting the craggiest and most inaccessible rocks, and are wild and untamable. The bighorn is also called the Rocky Mountain sheep.

BIGHORN RIVER, a tributary of the Yellowstone, which rises in Wyoming, near Fremont's Peak, and flows northeasterly, entering the Yellowstone near Blakely, Mont. The upper part of its course is noted for the grandeur of the mountain scenery. Its length is 450 miles, and it is navigable as far as Fort Custer.

BIGLOW PAPERS, the name given by James Russell Lowell to two series of poems written by him as satires on political conditions. One series appeared in 1848, and dealt with the Mexican War; the other, which touched on the Civil War and reconstruction, was published in 1867. Both were assumed to be the work of one Hosea Biglow, who used the "Yankee" dialect and displayed the sly humor and shrewdness that is supposed to be typical of that species of American. The following quotations are representative:

I du believe in bein' this
Or thet, ez it may happen
One way or t'other hendiest is
To ketch the people nappin'.

An' you gut to git up airly
Ef you want to take in God.

BIGNO'NIA, a family of plants of many species, inhabitants of hot climates, usually climbing shrubs furnished with tendrils. The flowers are mostly in clusters at the ends of stems or in the axils of the leaves. All the species are splendid plants when in blossom, and many of them are cultivated in gardens. Representative of the family are the trumpet creeper, much cultivated as a porch vine, and the cross vine, a climbing shrub common in Southern United States.

BIG SANDY, or **SANDY**, an affluent of the Ohio River, formed by the junction of the Tug Fork and the Louisa Fork. The Tug Fork rises in West Virginia and, flowing northwest, forms, with the Big Sandy, the southern boundary between West Virginia and Kentucky. The Louisa Fork rises in southwest Virginia and flows northwest into

Kentucky, then northeast to join the Tug Fork. The river is navigable for small boats for about 100 miles.

BILBAO, *bil bah'ō*, SPAIN, capital of the province of Biscay, and an important commercial city. The city lies on both banks of the River Nervion, eight miles from the Bay of Biscay, and is one of the leading ports of Spain. It is also a great railway center and is famous for the manufacture of swords, the *bilbos* of Shakespeare's plays. In the vicinity there are valuable iron mines. Population, 1931, 166,758.

BILE, a yellow, bitter liquid, separated from the blood by the cells of the liver and collected by the biliary ducts, which unite to form the hepatic duct. Bile passes from this duct into the duodenum, or by the cystic duct into the gall bladder, to be retained there till required for use. The flow of bile is continuous, but the amount varies during the twenty-four hours, being most abundant during digestion. The use of the bile is to aid in the digestion of fatty substances and to convert the chyme into chyle. It probably retards or prevents the decaying of food and may stimulate muscular action in the intestines. Jaundice is a diseased condition caused by an obstruction of the flow of bile into the intestine, and its reabsorption into the blood. When the contents of the gall bladder become infected gall stones form.

BILL, a word describing documents of widely differing character.

In legislation, a bill is a draft of a proposed law to be enacted into a statute. If adopted by majority vote, and signed by the executive, the bill then is known as an *act*. See CONGRESS OF THE UNITED STATES; PARLIAMENT, subhead *Parliament in Canada*.

In law, a bill may refer to many forms of legal documents, whose names partially explain their contents; as, a *bill of costs*, a *bill of particulars*.

In business, an itemized statement of goods sold, together with the value of each article and the total cost. The terms of sale are also stated.

In business a clerk whose duty it is to prepare invoices of goods sold to customers is called a *bill clerk*; the work is usually done on a typewriter. In government, the official who prepares bills which have become laws for the signature of the executive is known as the engrossing clerk. Original copies of such acts are filed in the archives.



BILLIARDS, a well known indoor game of skill, played on a rectangular table with ivory balls, which are driven against one another by means of an ash rod, or stick, called a *cue*, according to certain defined rules. The regulation table is four and one-half feet by nine feet in size, though smaller sizes are also made.

Rules of the Game. The game as played in America has taken a distinctive character, in regard to both the tables and the manner in which it is played. The older American game was the four-ball game (now rarely played by experts), and it was at first played on a six-pocket table, after the English pattern, then on a four-pocket table and finally on a pocketless table. The points of the game number usually thirty-four, fifty or one hundred. A point is made whenever the cue ball in a single shot touches the two object balls. At the commencement of the game, the players *bank for lead*, which is done by both simultaneously driving their balls against the bottom cushion; the ball approaching and resting nearer to the head cushion on the rebound decides the winner, both as to choice of balls and as to order of play. The table has two spots, one near each end of the table. A red ball is placed on the spot at the foot of the table, and the ball of the player who lost the bank for lead is placed on the spot near the head of the table.

The leader places his ball anywhere nearer the head of the table than his opponent's ball, and he tries to hit the red ball in such a way that his ball will strike, on its return, the ball of his opponent. If the leader succeeds, he has made a point, or *carom*, and he continues to play his ball at either of the others until he misses. Then his opponent plays his own ball, from where it lies, at either ball, under the same rules and conditions, until he misses a point. In this way the players alternate till the end of the game. If a ball jumps off the table after counting, the count is good and the ball must be placed on the spot at the foot of the table. When the cue ball is in contact with another, the balls are respotted and the player plays his own ball as at the commencement of the game.

Variations in the Game. The cushion carom game is a highly scientific play, it being necessary to a successful carom that the cue ball shall, in the course of the stroke, strike not only both object balls, but the cushion as well. The balk line is another limitation which has been imposed on the older game; in this form of the game a balk line eight, fourteen or eighteen inches from the rail is established, and the player is compelled to drive one or both object balls outside the line in order to count. In match games various handicaps are agreed upon, and strict rules concerning the manner of play are adopted. In social play, however, the rules are variously modified and fouls are rarely counted.

Other Details. The strokes are all made with a cue gradually tapering to the end, which is tipped with leather and rubbed with chalk to prevent its slipping off the surface of the ball struck. The cue is taken in the right hand, generally between the fingers and the thumb, and not grasped in the palm. With the left hand the player makes a bridge, by resting the wrist and the tips of the arched fingers on the table and extending the thumb in such a way as to allow a passage in which the cue may slide.

The shape of the table has varied from time to time. At first it was square, with a hole or pocket at each corner to receive the balls driven forward with a cue or mace; then it was lengthened and provided with two other pockets, and occasionally it has been made round, oval, triangular or octagonal, with or without pockets, according to the game required. It is covered with a fine green cloth and is surrounded by elastic india-rubber cushions. The table must be perfectly level and sufficiently firm to prevent vibration; the usual height of the surface from the floor is three feet.

The origin of the game is not known, it being ascribed both to the French and the English.

Billiard Balls. These are made usually from ivory. A good player will not use balls of inferior material, such as bone or a composition. When a tusk reaches the manufacturer, it is examined very carefully for flaws. If found perfect, the tusk is measured into proper lengths, which are two and one-half or three inches, according to the size of the ball desired, and the blocks are then turned into balls. In order to save the corners, the

turners cut a ring at each end and slowly deepen it until a rough ring drops off. Two rings are cut from each billiard ball block, after which it is almost round. It is then laid aside to dry for about six months. When it has been seasoned it is chiseled down smooth and exactly round. The ball is then polished by means of a machine and is treated to a rubbing, first with chalk and chamois skin, and finally with a plain, soft leather. Every particle of sawdust and shavings from the ivory is carefully saved. These are treated with chemicals, submitted to an enormous hydraulic pressure and molded into small articles so perfect that only an expert can tell them from solid ivory.

BILLINGS, JOSH. See SHAW, HENRY WHEELER.

BILLINGS, bil'ings, MONT., third city in size in the state, is the center of a great stock-raising district, 240 miles southeast of Helena, on the Great Northern, the Northern Pacific and the Chicago, Burlington & Quincy railroads. In addition to its stock shipments it is a wool-shipping center. Railroad shops are located here, and there is also a foundry, a beet-sugar factory, a creamery, and oil and refining companies. The city has Eastern Montana Normal School, Billings Polytechnic Institute, and several hospitals. There is a municipal airport, and there are five parks. Population, 1930, 16,380.

BILLINGSGATE, the principal fish market of London, on the left bank of the Thames, a little below London Bridge. From the character, real or supposed, of the Billingsgate fish dealers, the term *billingsgate* is applied to coarse and violent language.

BILL OF ATTAINDER, a legislative enactment involving capital punishment, or the confiscation of property, of persons accused of high offenses. Such acts are properly the functions of courts, and are unknown in the United States, being prohibited by the Constitution (Art. I, Sec. 9). These bills were formerly commonly passed by the British Parliament, especially in cases of particularly prominent persons, as Thomas Cromwell, the earl of Strafford and William Laud. Such a bill considered matters belonging wholly to the English judiciary and was passed in a most irregular manner, without allowing the accused a trial and upon evidence which was generally insufficient and

often inadmissible. Bills of attainder were abolished in England in 1870. See **ATTAINDER**.

BILL OF COSTS, in America an itemized list of the fixed costs of an action at law, which is filed by the successful party. After being verified and allowed by the clerk of the court, the amount is added to the judgment assessed against the loser of the case.

BILL OF EXCHANGE, a written order by one person to another, requiring the second to pay to a third person, or to his order or to bearer, at a certain or determinable time, a sum of money. Bills of exchange are *foreign* and *inland*, or *domestic*. The latter is commonly known as a *draft*. A *foreign bill* is one drawn in one state or country upon a person in another. A *domestic bill* is one drawn and payable within one country. The following are common forms:

Inland:

\$1000 Chicago, Ill., March 6, 1945
Ninety days after date pay A. B. or order,
one thousand dollars, with interest at the rate
of six per cent per annum, and charge to
account of C. D.
To E. F., Springfield, Ill.

Accepted, E. F.

Foreign:

\$1000 London, England, March 6, 1945
At sight of this first of exchange (second
and third unpaid) pay to A. B. or order, one
thousand dollars, and charge to account of
C. D.
To E. F., Chicago, Ill.

Accepted, E. F.

The details of the making of a bill of exchange, or draft, are given in the article **DRAFT**.

BILL OF HEALTH, a certificate or instrument signed by consuls or other proper authorities, certifying the state of health of crew and passengers at the time that ships sail from ports suspected of being subject to infectious diseases.

BILL OF LADING, or **WAY BILL**, a memorandum of goods shipped on board a vessel or by train, signed by the master of the vessel or freight authority, who thereby acknowledges the receipt of the goods and promises to deliver them in good condition at the place directed, subject to ordinary accidents. The bills are issued in duplicate or in sets of three, one being retained in the offices of the carrying company, one by the master of the conveyance and one by the person shipping the goods. They can be

transferred from one person to another by indorsement.

BILL OF RIGHTS, a phrase used in a variety of meanings, to denote an enactment or agreement embodying a fundamental right or principle that naturally belongs to a free people. Thus, a bill of rights has been inserted in the constitutions of most of the states of the United States enumerating rights of the people which shall not be infringed and limitations upon the rights of the state. The same name has been given to the first ten Amendments to the United States Constitution, which were added to satisfy the objection of some of the states, that the Constitution did not cover specifically enough certain inalienable rights of the people.

In English history the Bill of Rights is an act of Parliament passed in 1689, embodying the principles of political liberty now established in the English system of government. It is one of the three great instruments of the British constitution. Bills of rights have frequently been enacted in French history, especially after the Revolution of 1789.

BILL OF SALE, a formal statement certifying to the sale or transfer of personal property. It is a certificate of new ownership, designed to afford proof that the articles enumerated came honestly into possession of the holder. A bill of sale is often given to a creditor as security for borrowed money and empowers the receiver to sell the goods if the money is not repaid at the appointed time.

BILOXI, *bil ok'sie*, Miss., a popular resort city, both in winter and summer, sixty miles southwest of Mobile and eighty miles northeast of New Orleans, on the Louisville & Nashville Railroad. The city is situated on Mississippi Sound, which is a part of the Gulf of Mexico, and on Biloxi Bay, locally known as Back Bay, an arm of the Gulf. On Back Bay there have been in the past extensive ship-building interests.

The city's commerce is largely in oysters and shrimp, the output being worth several million dollars a year. There are several canning factories. The city has a soldiers' home and a Coast Guard base. A fine drive along the shore of the Gulf extends westward thirty miles to Bay Saint Louis. On this road, four miles from Biloxi, is Beauvoir, the former home of Jefferson Davis, now a state soldiers'

home. The city is a popular winter resort. Population, 1930, 14,850.

BIMETALLISM, that system of money in which coins of two metals (silver and gold) are legal tender to any amount; or in other words, the concurrent use of coins of two metals having equal legal standing, the ratio of value between the two being arbitrarily fixed by law. It is argued by advocates of the system that by fixing a legal ratio between the value of gold and silver, and using both as legal tender, fluctuations in the value of the metals are in part avoided, and the prices of commodities are therefore rendered more stable; also, that exchanges with countries using one or the other metal as a single standard are facilitated. Monometallists reply that bimetallism will not work, that the cheaper metal will always drive the dearer from use, whatever the legal ratio (see *GRESHAM'S LAW*).

Bimetallism was the legal monetary system in the United States from 1792 until 1873. The first monetary law passed after the adoption of the Constitution was enacted in 1792. It provided for the concurrent coinage of gold and silver dollars, the ratio of silver to gold being 15 to 1; that is, one ounce of gold was equal in value to fifteen ounces of silver. Later acts made fractional changes in the ratios. By the coinage act of 1873, the gold dollar of 25.8 grains was made the unit of value, and the country was legally on the gold standard as soon as specie payments were resumed in 1879 (see *SPECIE PAYMENTS, RESUMPTION OF*).

Not until 1900, however, was the gold standard specifically established by law. This was four years after the exciting campaign of 1896, when William Jennings Bryan, young candidate of the Democrats, toured the country and eloquently demanded the free and unlimited coinage of silver at a ratio of 16 to 1. Bryan's repeated defeats for the Presidency indicated a general indifference to the remonetization of silver, but in the economic and financial upheaval of the depression years, following 1930, interest in the subject revived. In 1934, when the Roosevelt administration adopted a monetary policy providing for the coinage of newly mined silver and raising the price of the metal, a group of Senators headed by Borah of Idaho openly sponsored a resolution demanding the complete establishment of the bimetallic system.

BINDER TWINE, a cord made especially for the fastening of grain into bundles when harvested by self-binding reapers (see *REAPING MACHINE*). Almost nine-tenths of all binder twine is made from the leaf fiber of a plant grown chiefly in Yucatan, Mexico. Though it is commonly called sisal, its correct botanical name is henequen. Another fiber used in making binder twine is obtained from so-called Manila hemp, which is grown in the Philippines. It is not a true hemp, but belongs to the banana family. Binder twine is made by machinery. Mechanical combs clean and soften the fibers, which are fed automatically to spinning machines in the form of a continuous ribbon. The spindles twist the ribbon into a single strand, which is wound on large bobbins holding about 650 feet each. The cord is then wound into balls.

BINDWEED, a genus of plants of the morning glory family, generally having creeping, twining stems and milky juice. The flowers are large and beautiful, but the plants of some species are extremely troublesome weeds, particularly the so-called *English bindweed*. This grows not only by its seeds, but also by slender creeping rootstocks, which make it particularly troublesome in grain fields and among hoed crops. If the plant is prevented from seeding and the land is cultivated in the late fall, the weeds may be reduced to control in a few seasons. Coal oil applied to the roots will kill them. The *hedge bindweed* lives in richer soil and has larger flowers a little later in the season. Sometimes the common morning glory runs wild and becomes a weed, but it seldom becomes a nuisance.

BINGEN, GERMANY, a noted town in the state of Hesse, at the confluence of the Nahe with the Rhine. Near by, on a rock in the Rhine, is the Mouse Tower, famous in legend. It is said that the cruel Bishop Hatto, in 969, caused hundreds of the poor to be burned to death in a barn, and when he sought refuge in the tower he was eaten up by innumerable rats and mice. An allusion to this story occurs in Longfellow's *Children's Hour*. Restored in 1856, the tower now serves as a beacon, telling ships, by means of a flag, if the Binger Loch, a whirlpool, is clear. On the opposite bank of the Rhine is the Niederwald Monument, erected in commemoration of the victories of the war with France, 1870-1871.

Every school child knows of Bingen through Mrs. Caroline Norton's poem, *Bingen on the Rhine*, which records the death of "a soldier of the legion" who "lay dying in Algiers." It closes with the line—

For I was born at Bingen, at Bingen
on the Rhine.

The district is noted for the culture of the vine. There are manufactures of tobacco, glue, starch and leather. Population, about 10,000.

BINGHAMTON, *bing'am ton*, N. Y., founded in 1787 as Chenango Point and given its present name in 1800, is the county seat of Broome County, 215 miles northwest of New York City, on the Lackawanna, the Erie and the Delaware & Hudson railroads. The Chenango and Susquehanna rivers unite within the city limits. It has several parks, the largest, Ely Park, containing over 130 acres. The industrial exposition grounds are of more than local note. The state has located here the state hospital for the insane, and there is a state armory. The manufactures include footwear, cameras and photographic supplies, pipe organs, business machines, automotive supplies, steel products, washing machines, motors and furniture. The town was incorporated as a village in 1834; it became a city in 1857. Population, 1930, 76,662.

BINOCULAR, *bi nok'u lar*, a microscope, telescope, or field glass, equipped with two tubes, so arranged that the observer uses both eyes in viewing objects. See **MICROSCOPE**.

BINO'MIAL, in algebra, a quantity consisting of two terms or members, connected by the sign + or —. The *binomial theorem* is the celebrated method, devised by Sir Isaac Newton, for raising a binomial to any power, or for extracting any root if it, by forming a series of terms whose coefficients and exponents increase and diminish regularly, according to a certain law. See **ALGEBRA**.

BIOCHEMISTRY, a somewhat forbidding word until it is understood that *bio*, from the Greek, is a prefix meaning *connection with life*. Biochemistry, then, is the science that is concerned with the chemical substances that comprise all animals and plants, and the chemical changes, always in evidence, that accompany the life processes of all living organisms. Before the term biochemistry came into use, the science was popularly called biological chemistry or physiological chemistry. The aim of biochemistry is to

learn as much as possible about the vast number of processes and conditions within the body by which life is maintained.

Chemistry has inquired into the nature of the substances of which plants and animals are composed. It has learned a great deal about the proper proportions, or balance, of the substances that assure healthy bodily growth, thereby being able in individual cases to point out divergencies from the normal that contribute to the breaking down of tissues and organs. Chemistry points out that the principal substances in any living organism are carbohydrates, proteins, and fats; in addition, there are present salts, acids, oils, and other ingredients, in number far greater than the layman imagines.

The *carbohydrates* are composed of the chemical elements carbon, hydrogen, and oxygen, largely. These are present in sugars, starches and gums, and, in plant structures, in cellulose. Carbohydrates are easily digested; they are burned (oxidized) within the body, a process that releases their energy. Vegetables are rich in sugars; starch is derived from such foods as wheat, oats, corn, and potatoes; in milk is an important carbohydrate called lactose.

The *proteins* are more complex in composition, for they contain carbon, nitrogen, hydrogen, and oxygen, and not infrequently sulphur, iron, and phosphorus. The proteins are muscle-building and repair material; they comprise the substances which give to bodies their form and furnish their strength. Important among the protein foods are the gluten of wheat, the whites of eggs, and particularly, all lean meats.

The *fats* contain carbon, hydrogen, and oxygen, but not in the same proportions as in carbohydrates, the proportion of oxygen being less; therefore when oxidation of fats occurs, there is greater heat generated. Pure fat generates about 4,000 calories per pound, whereas a typical sugar will generate less than 2,000 calories (see **CALORIES**). One will instantly associate butter and lard as among the fats; other fats are found in the fats of meats, in animal oils, and in those parts of vegetables that normally remain in a fluid state.

It has been stated above that animals derive their energy from their food, and it is common knowledge that much of the energy which contributes to plant growth, not to forget the soil ingredients on which there is

great dependence, is derived from the sun. The green coloring matter of plants, called chlorophyll, combined with the carbonic-acid of the atmosphere, which is a life-giving agent of plant life, chemically join with the constituent elements of water and form sugars. The plant has used sunlight in the production of these sugars, for solar radiations are found stored in their molecules. This entire process, not yet fully understood, is called photosynthesis. So it is incontrovertible that the energy of the sun is responsible for energy in man, for he is dependent upon food elements which in turn could not exist without the effect of sunlight upon plant growth.

Such are some of the foundation stones of biochemistry, in which the chemist shares with the physicist the labor of uncovering many of the hidden secrets upon which life depends.

BIOGEOGRAPHY, *bi o ge og'ra fie*, a division of geography which becomes of interest to the inquiring mind after the simpler facts of the subject have been mastered. The prefix *bio* is from the Greek, and means essentially *relation to life*. Biogeography then, may be called *life geography*. It includes within its scope the geography of plants, animals and man, the latter sometimes termed human geography. If one is desirous of knowing the scientific names of the three divisions, they are, respectively, phytogeography, zoogeography, and anthropogeography. Perhaps the last named, the geography of man, is the most absorbing of the three, but each is an absorbing story, too long for minutely detailed description in a work of reference.

Plant Geography (or Phytogeography). Plant life is dependent upon climatic conditions. In regions of eternal cold, no plants exist, but in cold regions where there are a few weeks of comparatively warm sunshine during the year there is a profusion of plant life. In Fairbanks, Alaska, just below the Arctic Circle, vegetables and flowers mark the brief summer. Explorer McMillan found that far north in Greenland, beyond civilization, hundreds of varieties of flowers flourish during the short growing season, and that during that time butterflies and bees are abundant.

Farther south vast forests of hardy cone-bearing trees (conifers) exist in temperatures that for much of the year are sub-zero. In

more temperate climes, where there is a growing season of nearly half a year, there is profusion of vegetable life, and here are the world's granaries. The tropics, always warm, often humid, present a riot of plant life throughout the year. From the Antarctic regions northward, plant life flourishes in the same zones as from the Arctic lands southward, but the seasons are reversed. When harvest-time occurs in the United States, Central Argentina is in mid-winter.

Plant life thus accommodates itself to climate, but this fact does not account for divergences in varieties in the same latitudes. In the far Southwest of the United States, for example, there are plants unknown in like warm areas in the Southeast, accounted for by differences in soil and degree of moisture. The cactus and the yucca are unknown in Florida, but are common in the dry regions of the Southwest. The methods of seed dispersal explain the presence of certain plant life in various localities (see SEED DISPERSAL), but seed varieties will die in inhospitable soil.

Cold and heat have not always been distributed over the earth in the zones that now mark our climatic belts. Explorers in the Arctic regions have located beds of coal where now trees do not grow, and Byrd reports the same condition on the far Antarctic continent (probably larger than the United States and Mexico), in regions devoid of vegetation. Far back in time, so far that computation even in millions of years is impossible, there was a wealth of vegetation where now is only snow and ice.

Animal Geography (or Zoogeography). Animals in the economy of nature distribute themselves in suitable environment. They have great freedom of movement as contrasted with plant life, but the presence of certain species in any locality is not accounted for solely by climatic conditions. A plant that needs heat cannot be made to flourish in cold regions, but animals to a degree can adapt themselves to climatic changes. Nature provides for these children of hers; the polar bear through ages of evolution thrives where his cousin farther south could not survive. The latter sleeps through the cold period each year (hibernation), but his polar relative has made himself immune to the effects of low temperatures. In a zoo one may see animals that have been brought together from all parts of the world,

but those that are thus forced out of their natural environment and are given no artificial aids to make them comfortable seldom survive.

Many animals in their now familiar locations have not always been there. Changing climatic conditions have caused animal migrations resulting in their present distribution, and on occasion man has carried to many sections animals hitherto unknown there, for economic reasons. Until 1850 there was not a rabbit in Australia; in that year a resident of New South Wales took home three pairs from the United States; in 1875 they were introduced in like manner into New Zealand. In both countries in a short time they became destructive pests. Introduction of the weasel and the mongoose to destroy them accounts for the presence of these animals there.

Human Geography (or Anthropogeography). Man can adapt himself to almost any climatic condition, but his preference is found to be locations neither very hot nor very cold, for temperate regions contribute most to his well-being, and only in those regions has he built up great communities far advanced in civilization.

In the glare of the tropical sun great achievements are never recorded, for heat is no incentive to ambition but rather is an invitation to idleness and ease, and prolific nature provides food in abundance with little labor. The Antarctic continent must remain lifeless, for it is destitute of provisions for food, clothing and shelter. True, Admiral Byrd and his companions survived there for a year on each of two occasions, but their lives were always in jeopardy. Everything needed to preserve life they carried with them; had supplies become exhausted or had serious accident befallen their equipment, they would have died. Not only does the region repel human beings, but the penguin and whale are almost the only representatives of animal life; at the present time the Antarctic sea is the world's most valuable whaling center. The Eskimos have learned to maintain existence in a land of ice and snow, but their constant combat with the elements in their quest for food and clothing makes material advancement impossible.

BIOGENESIS, *bi o jen'e sis*, literally the genesis or source of life, a biological term for the theory that living organisms, from the lowest to the highest, whether animal or

vegetable, come into existence only from pre-existing life forms of like nature with themselves. This is now the generally accepted theory; the opposite view, known as spontaneous generation or abiogenesis, being generally discarded. The accepted theory, however, is not free from difficulties, since it leaves us confronted with an insoluble mystery—the origin of life itself.



BIOGRAPHY, that department of literature which treats of the lives of men and women. If we accept the opinion that has been given world-wide expression to the effect that the history of a country is but the lengthened shadows of its greatest men, there is instant realization of the importance of biography in the lives of all of us. Biography in its simple forms

is found in the Old Testament accounts of the patriarchs. The legends of the Greeks and Romans were for the most part but biographical accounts of the lives of their gods and heroes. Biography received no great development among the ancient peoples, and it was, even among the later Greeks and Romans, little more than an account of the happenings in the life of a man. Plutarch's *Parallel Lives*, written in the first century after Christ, is the most important of the early biographical works which have come down to us. Although during the Middle Ages many lives of saints and martyrs were written, biography in its modern sense may be considered to date from the seventeenth century. Since that time individual biographies have multiplied enormously.

The ancient method of giving a mere chronicle of events has been greatly modified; selection of the more important events, emphasis on their relation to character, criticism, and even philosophical digressions, have made of biography a much less simple form of literature.

Examples of older notable biographies that have stood the test of time down the years is Boswell's *Life of Dr. Johnson*, the most famous of English biographies; Lockhart's *Scott*, Mrs. Gaskell's *Life of Charlotte Brontë*, Forster's *Dickens*, and Tennyson, by his son. The life of a person written by him-

self is called an *autobiography*, and as an example of this kind of writing Franklin's *Autobiography* may be mentioned.

Worth-While Biography. Assuming that one who would be a biographer should possess the ability to write forcefully and entertainingly, the next requisite, one of supreme importance, is intellectual honesty in treating his subject. This means that he must not expose himself to the charge of painting too heroic a picture, or, what is equally bad, of displaying a tendency toward prejudice that distorts facts and builds up legends that are erroneous and damaging to character. The only worth-while biography is one that holds the mirror up to truth, that depicts the life of a man or woman faithfully, according to attitudes that have been expressed in words and deeds.

A hero-worshipper, the preacher Weems, did not perform a service to George Washington when he inserted the cherry-tree story in his *Life of Washington*, the first important biography of that great man. Weems invented the incident to illustrate Washington's habit of truthfulness. Not for many years was it conclusively proved to be fiction.

An example of apparent prejudice—obviously not so intended—is shown in another life of Washington, recently published. The author set out to present a pen-picture of the true Washington, but in the public estimation he overshot the mark so far that little credence was given to the entire work. When a friend complained to President Coolidge that the book traduced the Father of His Country, the President looked out of the south window of the White House and remarked characteristically, "I see his monument yet stands."

Biography for Children. If the teacher or a parent of a child ever hears him say, "I don't like to read biography—I don't care for 'lives' of people," that teacher or parent may be sure that the lives have simply been presented to him in the wrong way. For everyone, young or old, is naturally interested in "lives"—if they are shown him from the right angle. What, indeed, are most of the stories which so delight children but biography, presented from the point of view which appeals to a child? Joseph, Daniel, David, King Arthur, the Cid, Roland—any child will listen to stories of them told over and over again, and then ask to hear them once more. We expect a child to like stories

of these heroes; we pick out the points that will strike the child's fancy, fire his imagination, hold his interest. But our attitude changes when we come to consider other men whom tradition has not marked as children's heroes. "Why," we say, "should a child be interested in the Apostle Paul? A boy or girl does not care particularly for preaching and for missionary work." And we forget that Paul had, if ever a man had, just those experiences that children love to hear about; that he was "in deaths oft, . . . in journeyings often, in perils of water, in perils of robbers, . . . in perils of the wilderness, in perils of the sea."

A Biography Suited to Children. A man was born in England about 125 years ago whose books sell today many times as extensively as when he was alive. The life-story of such a man is worth knowing, so it is offered below, in part, and it is presented as typical of what a short biography should contain to be interesting to boys and girls:

Charles Dickens

Charles Dickens was born in 1812, at Landport, a suburb of Portsmouth. He was less than three years old when the family moved to London, so that he could have no memory pictures of the place in which he was born. But he remembered, as most of us can remember some little thing that happened when we were very little, that everything was white with snow when they moved. Little Charles's family was comfortable enough—they had plenty to eat and to wear, and nobody seemed to worry much about money; for Charles's father was a clerk at a fairly good salary, and while there were a good many children, the money seemed enough to go around. But Charles was different from other boys in some ways. For one thing, he was never very strong, and could not join with other children in all their plays, so that he began very early to read, and to read books that most of us do not learn the names of until we are grown up. You see, there were not hundreds and hundreds of books in those days written just for children, with beautiful pictures and big print; and children who really wanted to read had to make what they could out of books written for grown people. But the books that little Charles found in a little room next to his own suited him very well. He could not understand all of them, but he knew that they were adventure stories, and he tells us, in *David Copperfield*: "I had a greedy relish for a few volumes of voyages and travels—I forget what, now—that were on those shelves; and for days and days I can remember to have gone about my region of our house, armed with the centerpiece out of an old set of boot-trees—the perfect realization of Captain Somebody, of the Royal British Navy, in danger of being beset by savages, and re-

solved to sell his life at a great price." And all of these stories, as well as some which his own bright little brain made up, Charles used to tell to his brothers and sisters and playmates.

It wasn't only the children that Charles used to tell stories to, either. His father was very proud of his clever little boy, and very often when there was company at the house would keep him up late, far too late for a little boy, telling funny stories and singing lively songs.

But suddenly all Charles's good times came to an end—his schooldays, his comfortable living, everything. In those days if a man could not pay his debts he was sent to prison, and that is what happened to Charles's careless father when Charles was about eleven years old. However, if a man in the debtor's prison had a little money he could buy good food and make himself fairly comfortable, and so it is likely that Charles's father, in prison, had a better time than Charles, who had been put to work in a blacking warehouse. He worked very hard all day, tying, trimming and labeling blacking pots; he had very little to eat; he slept all night in a miserable little attic; and he had only the roughest boys to talk with; but it was none of those things which made him most unhappy. It was simply that he could see no end to the wretched life; he couldn't see where he was to get any education or any time or chance to do anything worth while. And that was what Charles wanted most in the world—to make something of himself. He was very, very unhappy, so unhappy that he never liked, in his later days, to talk about this time.

But the wretched days came to an end after about a year, while Charles was still young enough to enjoy the things that other boys enjoy. He was sent to school, and of that school and his comrades there he has written again in *David Copperfield*.

It is a joy to us to know that Charles did have good times—real "boy" good times—after all his hard days. We like to read of the fun he had with a secret language which he made up, and which sounded like mere gibberish to those who did not know it; we like to hear about the little toy theater, all bright with paint and red fire, in which he made his toy actors act out the stories he was always so fond of writing; and we are sorry that the school days were so short, and that Charles was so soon back at work again. But this time it was more pleasant work. To be sure, he was little more than office-boy in a lawyer's office, but he was at least among people who saw that he was an unusual boy; he had a chance to learn, and time to learn. And he used the time and the chance with all his might. It does not sound unusual to say that he learned shorthand by himself, but it was a long, hard task, to which the boy set himself like a young hero. In his own bright way he has made David tell us some of the hard things about this shorthand learning. He had learned the alphabet, he says, but "there then appeared a procession of new horrors, called arbitrary characters—the most despotic characters I have ever known;

who insisted, for instance, that a thing like the beginning of a cobweb meant 'expectation' and that a pen-and-ink skyrocket stood for 'disadvantageous.'" When the learning period was over, one of his friends said of him, "There never was such a shorthand writer."

Dickens was now a man, more than ready to do a man's work. When you are older you will read his wonderful books, with their characters that everybody knows and remembers as if they were real people. But what we care most about now is the man Dickens. He was a very lovable man, a little quick and excitable and nervous, sometimes, but always bright and entertaining. His children must have been very happy and very proud of their father. He spent much time with them, playing, walking, reading. When he was away he wrote them funny letters; and the *Child's History of England* he wrote just for his own children, never meaning to have it printed. And once a year he gave all his time and energy to the children's big festival—the private theatricals which were always held at his home during the Christmas holidays. His children and their friends took the chief parts in the plays, and Dickens drilled them and kept them in constant gales of laughter.

Dickens lived to be only fifty-eight years old. When he died, people mourned for him as scarcely any other man has been mourned for. For hundreds of thousands of people had read his books, and all of these readers felt as if they had lost a personal friend. His own family wanted him buried near his own home at Gad's Hill; but Dickens had not belonged just to his own family, but to the public which had so loved him and his works. And that public felt that Dickens should be buried in the place where the most famous Englishmen have been buried—in Westminster Abbey. So there, in the Poets' Corner, they placed the body of the great writer whom Englishmen and Americans, grown people and children, still love.

Biography in the School. The teacher finds many uses for biography besides the merely intellectual one. There is nothing so helpful in character-building as well-selected, well-presented biographical materials. This does not mean that the admonition "Do thou likewise" is to be given every time a forceful act or a forceful character is presented: in fact, it means quite the opposite. If the factors that made a man great or good are put attractively before him, the child will have an instinctive desire to imitate them. Perhaps the clearest way to present this matter is to give here a brief outline survey of the outstanding characteristics of that first hero of every American school-child—George Washington. The children should know first, of course, the main facts of Washington's

GEORGE WASHINGTON

FEB. 22, 1732

DEC. 14, 1799



1 TRUTHFULNESS



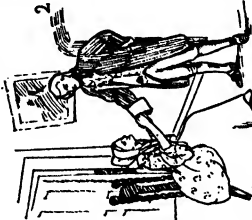
2 DESIRE FOR KNOWLEDGE



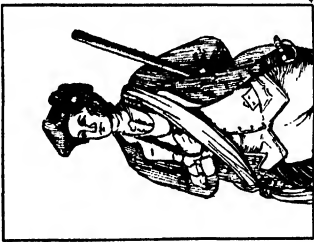
3 COURAGE



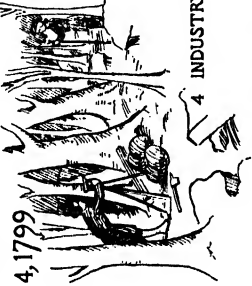
7 SELF-CONFIDENCE



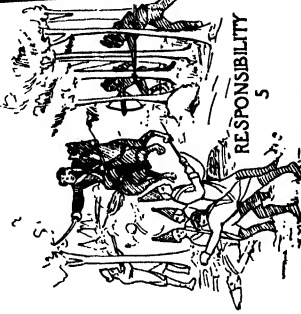
6 RESPECT



FIRST IN WAR, FIRST IN PEACE, FIRST IN THE HEARTS OF HIS COUNTRYMEN



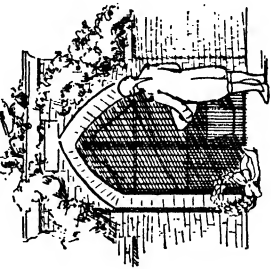
4 INDUSTRY



5 RESPONSIBILITY



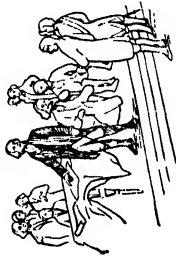
9 RESOURCEFULNESS



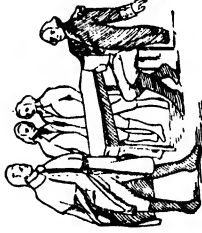
14 ESTEEM OF OTHERS



8 SELF-CONTROL



12 STATESMANSHIP



11 HUMILITY



10 PATIENCE AND KINDNESS

13 ESTEEM OF HIS COUNTRYMEN

THE CAREER OF GEORGE WASHINGTON
Graphic illustration wherein events emphasize character

life, that in this study the emphasis may be upon character not upon events. The illustration on the opposite page will make more interesting the items in this summary:

1. **Washington and the Cherry Tree**
2. **The Field School**
When a lad Washington attended a school taught in a one-room log school-house. Later he attended a better school.
3. **Breaking the Colt**
Washington's mother owned a colt which no one had been able to ride. Washington determined to break the colt. He succeeded, but the colt was so exhausted that it died. Washington went to his mother and told her he had killed the colt.
4. **Surveying**
Washington left school at sixteen, and engaged to survey a large tract of wild land for Lord Fairfax. The task occupied his time for three years.
5. **Responsibility**
When General Braddock was killed in the expedition against Fort Duquesne, the command of the British forces devolved upon Washington. Young as he was, he accepted the responsibility, and did much to save the British army from destruction.
6. **Respect and Reverence**
Washington always had the highest regard for his mother. He went to bid her farewell before starting to take command of the American army in 1776. After the surrender of Cornwallis, he visited her at the earliest opportunity.
7. **Self-Confidence**
Washington did not wish the command of the American forces, but when it was thrust upon him he accepted the trust and carried the Revolutionary War to a successful issue.
8. **Self-Control**
One of the most trying experiences in Washington's entire career was with General Charles Lee at the Battle of Monmouth, yet he did not fail to address Lee in a courteous manner.
9. **Resourcefulness**
Washington never allowed an opportunity to escape. When crossing the Delaware was supposed to be impossible, he accomplished the feat and inflicted a serious blow upon the British at Trenton.
10. **Patience and Kindness**
In the darkest hour of the Revolution, Washington never lost heart. He was kind to those dependent upon him in any way. During the winter at Valley Forge he daily visited the sick soldiers and helped them in every way he could.
11. **Humility**
Washington never felt himself above others. In the unsettled conditions preceding the Treaty of Paris a faction in

the army wanted to establish a monarchy with Washington as king. When their proposition was made to him, he refused it with indignation. This is the only instance in history in which a successful conqueror is known to have refused a crown.

12. **Statesmanship**
Washington's observations upon national affairs, as well as his success in the field, convinced the people that he was the most suitable man for the first President of the United States. He was inaugurated in New York, April 30, 1789. After taking the oath of office he delivered his inaugural address.
13. **Esteem of his Countrymen**
Wherever Washington appeared on his journey from Mount Vernon to New York, after his election as President, he was received with the greatest honors. As he crossed the bridge at Trenton, young ladies preceded him and strewed flowers in his pathway.
14. **Esteem of Others**
Upon Lafayette's visit to the United States in 1824 he went in mourning to the tomb of Washington. That act was expressive of the attitude of all European nations at Washington's death, and showed the esteem in which he was held abroad.

As a final summing up of this material on Washington, the pupils will enjoy learning these rules of conduct set down by Washington himself for his own guidance and that of others. It may be said of him more than of most men that he really lived up to his own rules:

Think before you speak.
Feed not with greediness.
Lean not on the table.
Neither find fault with what you eat.
Make no show of great delight in your food.
Let your countenance be pleasant, but in serious matters somewhat grave.
When another speaks be attentive yourself, and disturb not the audience.
Strive not with your superiors in argument, but always submit your judgment to others with modesty.
Undertake not what you cannot perform, but be careful to keep your promise.
Labor to keep alive in your breast that little spark of celestial fire called conscience.

Related Articles. The following lists contain the names of hundreds of noted persons whose biographies will be found in alphabetical order in these volumes

- | | |
|-----------------|-------------|
| See Drama. | ACTORS |
| See Astronomy. | ASTRONOMERS |
| See Literature. | AUTHORS |

BUSINESS MEN AND FINANCIERS

Armour, Philip D.
 Ashburton, Alexander
 Astor, John Jacob
 Astor, William B.
 Astor, William
 Waldorf
 Belmont, August
 Carnegie, Andrew
 Dupont (family)
 Field, Cyrus West
 Field, Marshall
 Gould, George Jay
 Gould, Jay
 Green, Hetty
 Harriman, Edward H.
 Hill, James J.
 Law, John
 Mackay, John William
 Mackay, Clarence
 Morgan, John Pierpont
 Pullman, George M.
 Rockefeller, John D.
 Rockefeller, J. D. Jr.
 Rothschild, Lionel
 Rothschild, Mayer A.
 Sage, Russell
 Schwab, Charles M.
 Stanford, Leland
 Vanderbilt, Cornelius
 Vanderbilt, William H.
 Vanderbilt, William K.
 Wanamaker, John

See Chemistry
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Bennett, James
 Gordon
 Bennett, James
 Gordon, Jr.
 Bok, Edward W.
 Brisbane, Arthur
 Brown, George
 Bryan, William
 Jennings
 Dana, Charles A.
 Garrison, William
 Lloyd
 Grady, Henry W.
 Greeley, Horace

See Education.

See Essay.

Abruzzi, Luigi
 Amadeo, Duke of the
 Americus Vesputius
 Amundsen, Roald
 Andree, Saloman A.
 Balboa, Vasco
 Nunez de
 Blenville, Jean
 Baptiste, Sieur de
 Cabot, John
 Cabot, Sebastian
 Cabral, Pedro Alvarez
 Cadillac, Antoine
 Cartier, Jacques
 Champlain, Samuel
 Chapman, Frank M.
 Clark, William
 Columbus, Christopher
 Cook, James
 Coronado, Francisco
 Cortez, Hernando
 Dawson, George M.
 DeSoto, Fernando
 Dias, Bartholomeu
 Drake, Sir Francis
 Dubuque, Julian
 Ellsworth, Lincoln
 Emin Pasha
 Eric the Red
 Franklin, Sir John
 Fremont, John
 Charles
 Froisher, Sir Martin
 Gama, Vasco da
 Gilbert, Sir Humphrey
 Gosnell, Bartholomew
 Greeley, Adolphus W.
 Hedin, Sven A.
 Hennepin, Louis
 Henry the Navigator
 Hudson, Henry
 Joliet, Louis
 Kennan, George
 La Salle, Sieur de
 Lewis, Meriwether
 Livingstone, David
 Mackenzie, Sir
 Alexander
 Magellan, Ferdinand
 Marquette, Jacques
 Nansen, Fridtjof
 Narvaez, Panfilo de
 Peary, Robert E.
 Pike, Zebulon
 Montgomery
 Pizarro, Francisco
 Polo, Marco
 Ponce de Leon, Juan
 Raleigh, Sir Walter
 Ross, James Clark
 Schuwatka, Frederick
 Scott, Robert Falcon
 Shackleton, Sir
 Ernest Henry
 Stanley, Sir Henry
 Morton
 Stefánsson, Vilhjálmur
 Tonty, Henry de
 Verrazano, Giovanni da

See Geology

See History.

Ade, George
 Bangs, John K.
 Browne, Charles F.
 Burdette, Robert J.
 Butler, Ellis Parker
 Cobb, Irvin
 Dunne, Finley Peter
 Haliburton, Thomas C.
 Jerome, Jerome K.
 Nye, Edgar Wilson
 Shillaber, Benjamin P.
 Smith, Sydney

See Invention.

See Newspaper.

See Law.

See Labor Organizations.

See Mathematics.

See Missions.

See Music.

MILITARY AND NAVAL LEADERS

American

Allen, Ethan
 Anderson, Robert
 Arnold, Benedict
 Bliss, Tasker H.
 Breckinridge, John C.
 Brown, John
 Buckner, Simon B.
 Buell, Don Carlos
 Bullard, Robert Lee
 Burnside, Ambrose E.
 Butler, Benjamin F.
 Cleaveland, Moses
 Clinton, George
 Custer, George A.
 Dearborn, Henry
 Decatur, Stephen
 De Kalb, Johann
 Dewey, George
 Early, Jubal A.
 Evans, Robley D.
 Farragut, David G.
 Foote, Andrew Hull
 Funston, Frederick
 Gates, Horatio
 Grant, Frederick D.
 Grant, Ulysses S.
 Greene, Nathanael
 Hale, Nathan
 Hampton, Wade
 Hancock, Winfield S.
 Hazen, William B.
 Hill, Ambrose P.
 Hood, John B.
 Hooker, Joseph
 Houston, Sam
 Hull, William
 Jackson, Andrew
 Johnston, Albert S.
 Johnston, Joseph E.
 Jones, John Paul
 Kearny, Philip
 Lawrence, James
 Lawton, Henry
 Lee, Charles
 Lee, Henry
 Lee, Robert E.
 Liggett, Hunter
 Logan, John A.
 Longstreet, James
 McClellan, George B.
 Mahan, Alfred T.
 Marion, Francis
 Meade, George G.
 Miles, Nelson A.
 Morgan, Daniel
 Moultrie, William
 Perry, Matthew C.
 Perry, Oliver H.
 Pershing, John
 Pickett, George
 Pike, Zebulon
 Porter, David
 Porter, David D.
 Revere, Paul
 Rosecrans, William S.
 Saint Clair, Arthur
 Sampson, William T.
 Schley, Winfield S.
 Schofield, John M.
 Schuyler, Philip
 Scott, Winfield
 Semmes, Raphael
 Shafter, William R.
 Sheridan, Philip H.
 Sherman, William T.
 Sigel, Franz
 Sigsbee, Charles D.
 Sims, William S.
 Stark, John
 Stuart, James E.
 Thomas, George H.
 Warner, Seth
 Warren, Joseph
 Wayne, Anthony
 Washington, George
 Wheeler, Joseph
 Wilkes, Charles
 Winslow, John A.
 Wood, Leonard
 Worden, John F.

Canadian

Brock, Sir Isaac
 Currie, Sir Arthur
 Frontenac, Louis de
 Hughes, Sir Sam
 Montcalm, Sieur de

English

Abercrombie, James
 Allenby, Lord Edward
 André, John
 Baden-Powell, Robert
 Beatty, Sir David
 Blake, Robert
 Braddock, Edward
 Burgoyne, John
 Campbell, Sir Colin
 Carteret, Sir George
 Clinton, Sir Henry
 Clive, Robert
 Cornwallis, Lord
 French, Sir John
 Gage, Thomas
 Gordon, Charles
 Haig, Sir Douglas
 Havelock, Sir Henry
 Howe, Sir William
 Jellicoe, Sir John
 Kitchener, Horatio H.
 Marlborough, Duke of
 Moore, Sir John
 Nelson, Horatio
 Oglethorpe, James E.
 Pakenham, Edward M.
 Wellesley, Marquis
 Wellington, Duke of
 Wolfe, James
 Wolsley, Garnet J.

French

Foch, Ferdinand
 Joan of Arc
 Joffre, Joseph J.
 Lafayette, Marquis de
 Murat, Joachim
 Napoleon I
 Ney, Michel
 Pétain, Henri

German
 Blücher, Gebhard von Moltke, Helmuth C.
 Hindenburg, Paul von Moltke, Helmuth J.
 Ludendorff Steuben, Baron von

Others
 Aguinaldo, Emilio Nokl, Kl-teu
 Alexander the Great Pompey
 Bolivar, Simon Pyrrhus
 Caesar, Caius Julius Santa Anna, Antonio
 Charlemagne Toko, Heihachiro
 Garibaldi, Giuseppe Tromp, Martin H.
 Hannibal Xenophon

NATURALISTS
 Agassiz, Louis J. Hensaday, William T.
 Audubon, John J. Huxley, Thomas H.
 Beebe, William Laparck, Jean B.
 Burroughs, John Le Moine, Sir James
 Chapman, Frank M. Linné, Karl von
 Cuvier, Baron Wallace, Alfred R.
 Darwin, Charles R.

NOVELISTS
 See Novel.

ORATORS
 See Oration.

PAINTERS
 See Painting.

PHILOSOPHERS
 See Philosophy.

PHYSICIANS
 See Medicine.

PHYSICISTS
 See Physics.

PIONEERS
 Boone, Daniel Crockett, David
 Carson, Christopher Ross, Alexander
 Clark, George Rogers

POETS
 See Poetry.

PRESIDENTS OF THE UNITED STATES
 See President.

PSYCHOLOGISTS
 See Psychology.

REFORMERS
 Addams, Jane Livermore, Mary A.
 Anthony, Susan B. Lockwood, Belva A.
 Bergh, Henry Luther, Martin
 Booth (family) Melancthon, Philip
 Calvin, John Mott, Lucretia C.
 Catt, Carrie Chapman Owen, Robert
 Dow, Neal Phillips, Wendell
 Garrison, William L. Stanton, Elizabeth C.
 Gough, John B. Tyndale, William
 Huss, John Willard, Frances E.
 Knox, John Wycliffe, John

RELIGIOUS LEADERS
 See Religion.

RULERS
 See articles on countries.

SCULPTORS
 See Sculpture.

SOCIALISTS
 See Socialism.

STATESMEN
American
 Adams, Charles F. Clinton, DeWitt
 Adams, Charles F., Jr. Conkling, Roscoe
 Adams, Samuel Cullom, Shelby M.
 Aldrich, Nelson W. Cummins, Albert B.
 Beveridge, Albert J. Cutler, Manasseh
 Blaine, James G. Davis, Jefferson
 Blair, Francis P. Davis, John William
 Blair, Francis P., Jr. Depew, Chauncey M.
 Blair, Montgomery Douglas, Stephen A.
 Bond, Richard P. Fairbanks, Charles W.
 Bonaparte, Charles J. Franklin, Benjamin
 Breckinridge, John C. Gallatin, Albert
 Bryan, William Garner, John Nance
 Jennings Gillett, Frederick H.
 Burlingame, Anson Hamilton, Alexander
 Burr, Aaron Hamlin, Hannibal
 Calhoun, John C. Hancock, John
 Cannon, Joseph G. Hanna, Marcus A.
 Carroll, Charles Hay, John
 Cass, Lewis Hayne, Robert Y.
 Chase, Salmon P. Hughes, Charles E.
 Choate, Joseph H. Jay, John
 Clark, Champ Johnson, Hiram W.
 Clay, Henry Knox, Philander C.

La Follette, Robert M. Pinckney, Charles C.
La Guardia, Fiorella Randolph, John
Landon, Alfred M. Reed, Thomas B.
Lodge, Henry Cabot Reid, Whitelaw
Logan, John A. Root, Elihu
McAdoo, William G. Schurz, Carl
Marshall, Thomas Sherman, John
Riley Stanton, Edward M.
Morrill, Justin S. Stimson, Henry L.
Morris, Gouverneur Sumner, Charles
Morris, Robert Tilden, Samuel J.
Morton, Julius S. Underwood, Oscar
Morton, Levi P. Webster, Daniel
Olney, Richard White, Andrew D.
Otis, James Whitlock, Brand
Page, Walter H. Yates, Richard
Parker, Alton B.

Canadian
 Abbott, Sir John J. C. Laurier, Sir Wilfrid
 Blake, Edward Macdonald, Sir John A.
 Borden, Sir Robert Mackenzie, Alexander
 Bowell, Mackenzie Mackenzie, William L.
 Brown, George Strathcona and Mount
 Cartier, Sir Georges E. Royal, Lord
 Chapleau, Sir Joseph A. Tupper, Sir Charles
 Davies, Sir Louis H.

English
 Asquith, Herbert H. Dufferin and Ava.
 Balfour, Arthur J. Marquis of
 Bright, John Eden, Robert Anthony
 Buchan, John Fox, Charles J.
 Buckingham, Duke of George, David Lloyd
 Burke, Edmund Gladstone, William E.
 Campbell-Bannerman, Grey, Earl
 Sir Henry Grey, Edward Viscount
 Carson, Sir Edward Hampden, John
 Chamberlain, Joseph Hastings, Warren
 Churchill, Winston L. Law, Andrew Bonar
 Clarendon, Earl of Milner, Alfred
 Cobden, Richard Montford, Simon de
 Connaught, Duke of North, Lord
 Cromwell, Oliver Peel, Sir Robert
 Curzon, Lord Pitt, William
 Devonshire, Duke of Walpole, Horace
 Disraeli, Benjamin Walpole, Sir Robert

French
 Briand, Aristide Grevy, Jules
 Cambon, Jules Martin Hébert, Jacques Rene
 Carnot, Marie François Herriot, Edouard
 Casimir-Perier, Jean Lafayette, Marquis de
 Paul Laval, Pierre
 Clemenceau, Georges Loubet, Emile
 R. Mazarin, Jules
 Delessé, Theophile Mirabeau, Count de
 Doumergue, Gaston Poincaré, Raymond
 Fallieres, Clement Richelieu, Cardinal
 Armand Talleyrand-Perigord,
 Faure, François Felix Duke de
 Gambetta, Leon Thiers, Louis Adolphe
 Genet, Edmond Charles

German
 Bernstorff, Johann H. Caprivi, George Leo
 Bethman-Holweg, Ebert, Friedrich
 Theobald Hitler, Adolf
 Bismarck-Schönhausen Liebknecht, Karl
 Greek, (Ancient and Modern)

Alcibiades Pericles
Aristides Pisistratus
Draco Solon
Epaminondas Themistocles
Lycurgus Venizelos, Eleutherios

Irish
 Collins, Michael Parnell, Charles
 De Valera, Eamon Stewart
 Dillon, John Redmond, John E.
 O'Connor, T. P.

Italian
 Cavour, Count Camillo Mussolini, Benito
 Machiavelli, Niccolo

Mexican
 Carranza, Venustiano Huerta, Victoriano
 Diaz, Porfirio Madero, Francisco

MISCELLANEOUS
 Alden, John Blennerhassett,
 Aspasia Harman
 Beatrice Portinari Blondel
 Beard, Daniel C. Boleyn, Anne

Bothwell, James
 Hepburn
 Bridgman, Laura D.
 Camp, Walter
 Carteret, Sir George
 Carver, John
 Catiline
 Cenci, Beatrice
 Corday d'Armont,
 Marie Anne
 Charlotte
 Coriolanus
 Coverdale, Miles
 Crassus, Marcus
 Licinius
 Crichton, James
 Damocles
 Damon and Pythias
 Darling, Grace H.
 Dinwiddie, Robert
 DuBarry, Marie Jeanne
 Erasmus, Desiderius
 Faust, Johann
 Frohman, Charles

Gerard, James W.
 Grey, Lady Jane
 Hoover, Herbert
 John of Gaunt
 Josephine, Marie Rose
 Keller, Helen Adams
 Kidd, William
 Lenine, Nikolai
 Olmsted, Frederick L.
 Peter the Hermit
 Petrarch, Francesco
 Pinchot, Gifford
 Robin Hood
 Rob Roy
 Rolfe, John
 Selkirk, Alexander
 Smith, John
 Spartacus
 Standish, Miles
 Stradivarius, Antonio
 Trotsky, Leon
 Washington, Martha
 Webster, Noah

Value of Questions in Biography. As a means of stimulating interest in the lives of great men and of increasing one's store of information, questions in biography have very great value. Reading the questions is not enough, however. The question is of real value only when it excites in the reader a desire to pursue the trail indicated. This desire must be strong enough to incite him to action. The clue having been given, it is necessary for the inquirer to look up the answer, which is to be found somewhere in the biography in question. It may be necessary to read the entire sketch before the particular point is found. The questions which follow are presented for the purpose of stimulating curiosity and inducing the reader to investigate freely the wealth of information at his disposal. For the convenience of the reader the questions are classified into various groups, such as history, literature, etc.

The questions which follow indicate the general trend of interrogations that the teacher will find very helpful in her class work. They may serve as examples of what she may prepare herself for her classes upon any given subject not touched upon here. The object of biographical questions is not merely to fill the mind of the child with a mass of unrelated material, for such an end serves no good purpose. Questions of the nature of those given here should be a mental stimulus. It is desirable to lead the child early in his school life into the field of research, at first of course in a limited way. It is also essential to lead him into habits that do not condone mental sluggishness. He must be taught to "follow through" for information, and must learn to consult all possible sources.

Who, What, Where in Biography

Famous Women

What was George Eliot's real name?
 In what story does she portray her girlish personality?

What names have made the reign of Elizabeth one of the most famous literary periods of all time?

What famous poetic drama was inspired by the life of Beatrice Cenci?

What national association was organized by Susan B. Anthony? Who worked with her in this movement?

What painting by Rosa Bonheur was purchased for \$55,000 by Cornelius Vanderbilt?

What is Louisa M. Alcott's most popular book?

What poem by Elizabeth Barrett led to her marriage to Robert Browning?

For what achievement is Jane Adams famous?

In the plays of what author has Maude Adams been most successful?

Who was the first president of the American Red Cross Society?

For what are Alice and Phoebe Cary celebrated?

Who was Hypatia? What led to her brutal murder by the clergy?

How old was Queen Victoria when she ascended the throne? How many years did she reign? When and at what age did she die?

At what age did Wilhelmina become queen of the Netherlands?

In what field of labor did Frances Willard become world-famous? Where was she born?

Was Emma Hart Willard, who wrote "Rocked in the Cradle of the Deep," related to Frances Willard?

What are some of the principal productions from the pen of Mrs. Humphry Ward?

Who was the first chief of the Federal Children's Bureau?

For what is Jeannette Rankin noted?

Actors and Dramatists

In the presentation of what plays did Edwin Booth win fame?

What is the nationality of Bernhard? For what lines of work is she noted other than acting?

What are the principal dramas of Shakespeare presented today?

In what lines of activity has David Belasco won fame? George M. Cohan?

Discoverers and Explorers

What famous search mission was undertaken at the suggestion and expense of James Gordon Bennett?

How did it happen that the new continent was named after Americus Vesputius?

Where did Andree start on his balloon expedition to the North Pole? What was the result?

What were the education and the early tastes of Christopher Columbus?

What was the most famous of Drake's voyages?

How was Vasco da Gama rewarded by the Portuguese government for being the first to round the Cape of Good Hope?

What was Robert E. Peary's greatest achievement?

From what very humble origin did Livingstone make his way to fame?

Who is Captain Roald Amundsen? What did he do to entitle him to fame?

Educational

Along what lines did Booker T. Washington work in the education of the negro?

For what is Euclid noted? Sir Isaac Newton?

Who were the modern followers of Aristotle?

What is the plan of the Carnegie Institution? Where is it located?

Who founded Harvard University, and when?

Who was Horace Mann?

Historical

What were the various stages of negro emancipation?

From what social class was Washington descended and how long had his family been in America?

Where did Croesus obtain his proverbial wealth?

Who was Marcus Aurelius?

What was the career of Caius Marius?

What is the story of Romulus and Remus?

For what was Alfred the Great noted?

What was Kitchener's contribution to the allied cause? How did he lose his life?

What was the far-reaching object of Lyeurgus?

What repeated penalties did William Penn suffer for his Quaker opinions?

What parliamentary acts were passed in Asquith's Ministry?

What were the great events of Queen Victoria's reign?

Who was Chinese Gordon or Gordon Pasha?

Who was the last ruler of the Hohenzollern line? The Hapsburg?

What Presidents of the United States have been assassinated?

What precedent did President Wilson break in attending the Peace Conference?

For what are the following persons noted: Clemenceau, Venizelos, Lloyd George, Ebert, Liebknecht and MeAdoo?

What new nations have risen from the ruins of Austria-Hungary?

Who are the Russian Bolsheviks?

Why did America enter the World War?

Inventors

Who is Marconi? What is his important discovery?

Who originated the submarine?

How is the story of Thomas Edison's life typically American?

What is the great invention of George Westinghouse.

What machine invented by Eli Whitney has been the means of the saving and making of millions of dollars every year?

Musicians

To what king was Mendelssohn appointed musical director?

When was Sousa's band first organized?

For what is Antonio Stradivarius noted?

From what did Wagner select his subjects?

For what is Caruso noted? John McCormack?

Military and Naval

Why was General Grant called "Unconditional Surrender" Grant?

How did Pershing help win the World War?

When did Dewey become an admiral?

When did General Weyler leave Cuba?

When did Funston capture Aguinaldo?

Who commanded the Invincible Armada?

In what famous battle were the Confederate forces successful under the leadership of Bragg?

What Japanese leaders won fame in the Russo-Japanese war?

How did Foch wring victory from defeat?

The signing of what document ended fighting in November, 1918?

Philosophers

What famous simile did John Locke make in describing the human mind?

What was Plato's philosophy?

Who were the Seven Wise Men?

What system of reasoning did Sir Francis Bacon advocate?

What was Socrates' method of arriving at the truth?

Political

For what reason did McKinley receive more than the average vote of his party in 1896?

For what was Cleveland's second administration memorable?

At what very early period did Martin Van Buren enter political life?

How did James A. Garfield's unexpected nomination for the Presidency come about?

What was the cause of the split in the Republican party in 1912?

Statesmen and Orators

Who was at the head of the War Department during Lincoln's administration?

What principle dominated Webster through all his political life?

What was Gladstone's public career?

How long was Herbert Asquith Premier of England?

Who was Paul Kruger? For what principles was he fighting?

Who was Ito? What did he do for his country? In what way did the United States help him?

Why is Woodrow Wilson called a world statesman?

What is there remarkable about Lloyd George?

Why is Clemenceau called the "tiger of France"? What did he achieve?

Patriotic

In what way did Congress make recognition of Lafayette's services?

What saying by Admiral Nelson has become an English slogan?

What part in affairs of Colonial times did Patrick Henry take? What is his famous saying?

For what was Joan of Arc noted?

In what way did Florence Nightingale serve her country?

Who was James Lawrence? When did he utter the famous words: "Don't give up the ship"?

Scientific

For what is Pasteur noted? Professor and Madam Curie?

By whom was radium discovered?

What is liquid air? Who has been the most successful experimenter with it?

Who founded the Agassiz Association? What was his object?

Who discovered the method of obtaining ammonia from sal-ammoniac?

For whom is the electric unit *ampere* named? What theory did he originate?

For what is Alexis Carrel noted?

BIOLOGICAL SURVEY, a Bureau of the Department of Agriculture of the United States, charged with the study and preservation or control of wild life, on land and in the air, throughout the national domain. The work of the Bureau is distributed among six units—those of biological investigations, research into food habits, fur resources, control of predatory animals and rodents, game and bird conservation, and of land acquisition for game and bird reservations, or sanctuaries. A field group of more than 6,000 persons is engaged in this "wild life service"—another name for the Survey—under direction of the Bureau in Washington. There is effective coöperation of a voluntary nature by sportsmen's associations, state conservation departments, and scientific societies, as well as by individuals.

The westward "course of empire" has peopled vast areas once given over to wild life, and birds and game animals have suffered in the degree that man has made their homes his own. Indifference and the desire to kill, for pleasure or profit, have reduced some species almost, if not quite, to extinction. The last passenger pigeon in America disappeared early in the present century, and the buffalo was in danger of extinction until recently; these are but two examples.

Various species of wild life require not only food in abundance but areas for unmolested feeding and resting and for caring for their young. Some birds and animals are foes of the farmer and the stock-raiser to some extent, and means for their control are studied; others provide raw material for food and clothing, and it is essential to conserve such species and provide for them reserves safe from molestation. Animal and bird sanctuaries are scattered over the nation; some of these are only 4,000 or 5,000 acres in extent, while others cover more than 50,000 acres. An example of a limited area is a migratory bird sanctuary in Illinois in the heart of the duck-hunting country; examples of larger reserves are the 64,720-acre super-refuge for waterfowl on the Pacific coast and the 137,000-acre tract of coastal marsh in Southern Louisiana available to migratory waterfowl. There are sections set aside where the hunting of game is entirely prohibited. Sportsmen may not enter with their guns upon any of the hundreds of sanctuaries that have been established.

The Survey coöperates with the states in

the enactment of beneficial game laws, by which hunting is limited to brief periods at certain times of the year for various kinds of game.

[Fish propagation and conservation is under control of the Bureau of Fisheries, a unit of the Department of Commerce.]

BIOLOGY, the science that is based on the study of living things and the complex phenomena of life. The term is derived from two Greek words, *bios*, life, and *logos*, a study. The subject deals with organic matter comprising the whole world of living organisms, and designs to separate this field from the inorganic world; the latter is concerned with such sciences as geology, astronomy, physics, etc. Chemistry deals with substances both organic and inorganic.

So broad is the scope of biology that we should not consider it as a single unit in the field of knowledge and of scientific investigation; rather, it is necessary, in order to cover it fully, to divide it into numerous related branches. Few persons are able to master, or will attempt to master, more than a single phase of the broad subject, though the specialist in any of its branches must have good foundation knowledge of the entire biological domain. The entire group of subjects thus related are identified in a body as the biological sciences. The two chief divisions are botany and zoölogy; those of greatest importance are the following:

Anatomy, a fundamental science which treats of the internal structure of living bodies. It has numerous subdivisions, such as human anatomy and plant anatomy, terms which define themselves, and comparative anatomy, which compares the structure of man and the lower animals or the structures of animals of different orders.

Anthropology, the science which deals with the similar points of structure in man and the lower animals, and with differences between them; of man's intellectual nature and physical structure, and of the general physical and mental development of the human race. An important branch of anthropology is ethnology, which studies to place mankind in related groups. Another, zoölogical anthropology, seeks to learn everything possible as to man's relation, however remote, to the lower animals.

Botany, one of the two foundation stones of biology, is the science which treats of plant life. It contains numerous subdivisions,

such as structural botany, which relates solely to the structure and organization of plants; physiological botany, relating to the functions of plants and their method of growth (once commonly referred to as biological botany); systematic and descriptive botany, the former concerned with those plant peculiarities which determine the relationship of one plant to another, the latter especially devoted to the scientific naming of plants (nomenclature). Some scientists devote themselves to geographical botany, which seeks to understand world distribution of plants and the causes which contributed to such distribution. Another and more remote division of botany is paleontology (see below).

Ecology, a comparatively new science which treats of either a single plant organization or a plant community in its relation to its environment. An important branch of this subject is physiological ecology, which is the study of the reactions of plants to new environment, and this development is of great benefit to agricultural science. Ecology overlaps other divisions of science, particularly geology and geography.

Embryology, the science which embraces everything relating to the germ, or beginning, of life in all living and growing things. Its range includes the study of all embryonic forms, from that of man down the scale to the simplest animal and vegetable organisms, and their development, step by step, into the likeness of the parent.

Eugenics, a word of Greek derivation, meaning *well-born*, is concerned with racial improvement; that is, it is the science of developing improved types or qualities in human offspring. Nearly all countries high in intelligence skirt the field of eugenics with legal declarations as to who may and may not marry, and a few states are so far advanced that they provide for certain examinations of those contemplating matrimony. Under Nazi rule in Germany, an amazing experiment in eugenics, which forbade mixture of certain races, and much stressed before the entire world, was attempted. This branch of biology is receiving a constantly increasing degree of attention.

Genetics, from a Greek word, meaning *to be born*, is that branch of biology that refers to heredity and variation, viewed from the standpoint of evolution. It covers particularly plant and animal breeding; all that is

learned is applied to the development of better strains. It will be seen that there is a relationship between eugenics and genetics; the difference is largely that the former concerns itself with improvement of the physical and mental qualities of human beings only.

Histology, in brief, is microscopic anatomy. It deals with the minute structure of animals and plants, without regard to their functions. It is allied with anatomy, and is closely related to morphology and physiology.

Morphology, to which histology is linked, deals in a broad way with the form and structure of plants and animals, without reference to the functions the different parts perform. In connection with plant life, morphology may be called structural botany; plant anatomy is a term for internal morphology.

Paleontology deals with life that was developed during various past geologic ages. It can be studied only from fossil remains. The subject is treated from both biological and geological standpoints. The geological aspects serve to mark periods or approximations of time in earth development.

Physiology, the science which deals with the structure and functions of the organs of a living body and of phenomena arising from the natural flow of life in bodily tissue. The subject is related to anatomy—the facts of bodily structure—and to hygiene—the methods and devices necessary to adopt in order to retain health. The two main aspects of this branch of biology are animal physiology and plant physiology.

Psychology, at first glance, may not appear properly to be named a branch of biology. It treats of the workings of the mind of man, seeks to learn the actuating impulses to behavior (“what makes the wheels go ‘round’”), and delves into the phenomena of consciousness, all related in many ways to biological science.

Sociology, as well as psychology, may be considered by many as outside the realm of biology, but there are points of contact. Sociology relates to whatever arises from the lives of people in association; it is the science of the origin, growth, and development of relations among human beings, with all the ramifications the phrase suggests. Individual behavior has an effect upon mass behavior, both being cultural aspects such as come to the studied notice of the biological scientist.

Zoölogy, meaning the *science of life*, is one of the two main pillars of the science of biology; the other is botany. Botany treats of plant life only; zoölogy is concerned only with the animal kingdom, its members considered individually and as classes. The general subject is broken up into most of the related sciences described above; nearly all of these subdivisions are given adequate treatment elsewhere in these volumes. It may be stated, in passing, that science recognizes further subdivision of some of these branches, but they are not of absorbing interest to the general student.

Nearly all departments of science have been called upon to explore into the realm of biological knowledge, and chemistry, especially, has helped to raise each of the subdivisions above named practically to the dignity of a science in itself.

The Aims of Biology. The end sought by ceaseless investigation into all the related phases of biological science is to learn what is life, how it began, how it functions, how it may be conserved, how strains may be improved, all seeking to find satisfactory answers to questions that are as old as the race.

How Life Began. It seems strange now to recall that many people once believed that a horse hair placed in water would in time develop into a snake, and that maggots appeared spontaneously at a certain period accompanying the decomposition of meat. Such theories of the beginning of life were attributed to what is known as spontaneous generation—developing life from merely an internal impulse, without the force of an external exciting cause.

The invention of the microscope promoted studies which forever dissipated such erroneous ideas. We know now that nothing that lives had its beginning in spontaneous generation, but that life once unaccounted for on any rational basis is due to the presence of cells so minute as to be invisible. Where they had their beginning, we know not, but some day this may not be quite so puzzling a question, although the Divine economy probably never will reveal complete answers.

In 1935 a remarkable discovery was made which possibly may some day have startling implications. From deep in the ocean bed off the Pacific coast a bucket of mud and ooze was brought to the surface. It was found to contain bacteria unlike any ever

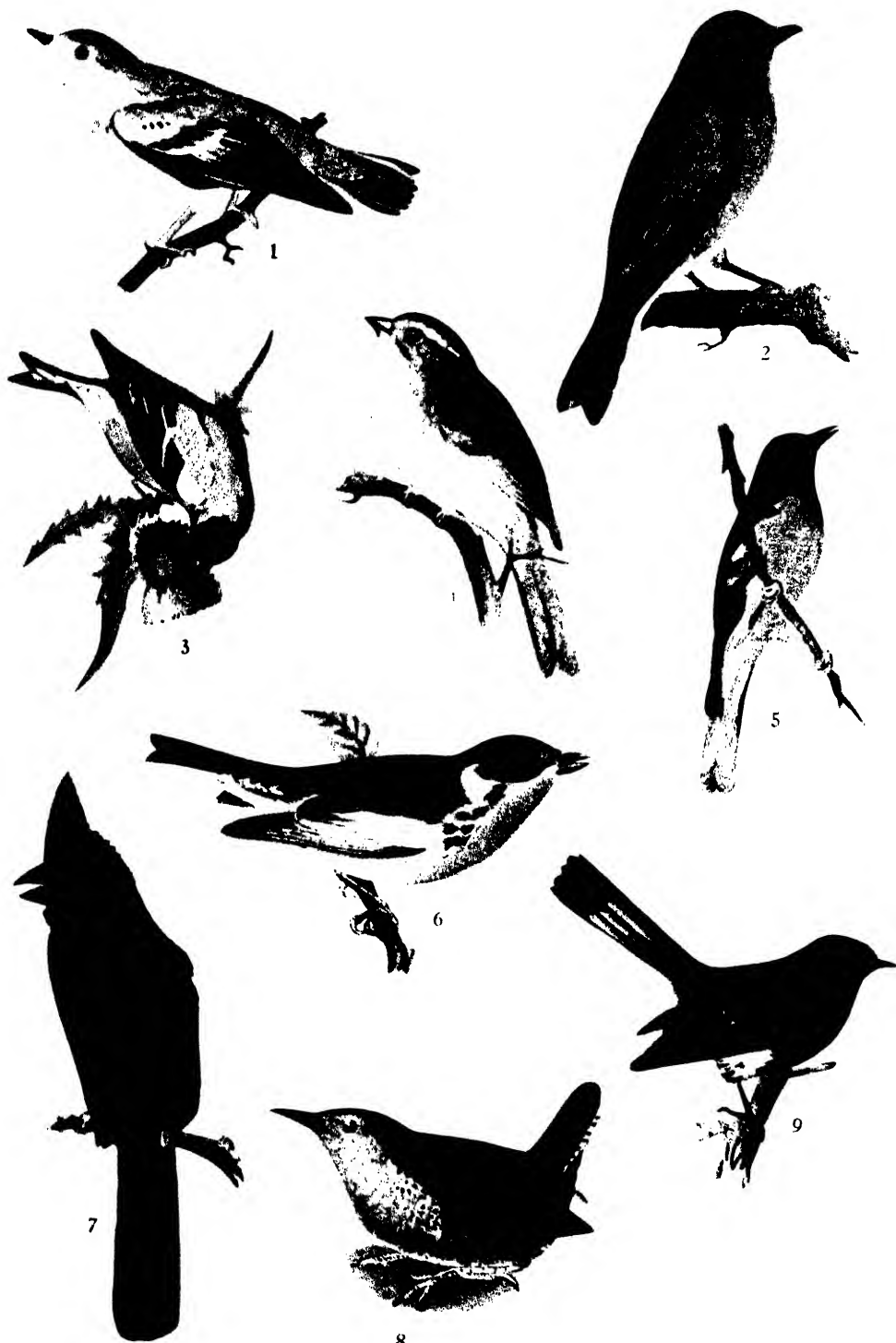
before encountered by science. These bacteria flourished in salt sea water, but perished on being at once transferred to fresh water. Upon experimentation it was discovered that by very gradual introduction of fresh water into their normal element the bacteria, or germs, little by little accommodated themselves to the change, until finally they were as active in one element as in the other, and they could liberate themselves and live in the air. Science believes it is able to deduce from this discovery that if all living things were to be swept from the earth there exist organisms which in the course of millions of years of evolution could again cover the land and fill the sea with life.

The Theory of Protoplasm. Today protoplasm is considered to be the physical basis of life. It may be defined simply to the non-scientific mind as a granular, transparent, jelly-like substance, a fluid that occurs in the form of infinitesimal units that we call cells; each of these cells is an organized unit, and each is capable of growth and reproduction. We know that the lowest forms of animal life are tiny, single-celled specimens of this living matter, yet these simple cells contain in rudimentary form all the elements or properties found in animals of the highest orders, including man. That every living thing originated in cell structures is the assured belief of science.

Related Articles. Consult the following titles for additional information:

Acclimatization	Evolution
Anatomy	Fossil
Animal	Heredity
Animal Intelligence	Histology
Anthropology	Man
Bacteria	Morphology
Biochemistry	Natural Selection
Biogenesis	Paleontology
Botany	Physiology
Breeding	Plant
Cell	Protective Coloration
Classification	Protoplasm
Death	Psychology
Degeneration	Sociology
Ecology	Spontaneous Generation
Embryo	Zoology
Environment	
Eugenics	

BIRCH, *burch*, a genus of trees which comprises only the birches and alders, found in North America, Europe and Northern Asia. The common birch is extremely hardy, and only one or two other species of trees approach so near to the North Pole. The wood, which is light in color and firm and tough in texture, is used for chairs, tables, bedsteads and the woodwork of furniture generally, also for fish-casks and hoops, as well as for many small articles. In Northern



COMMON AMERICAN SONGSTERS

1. Cerulean Warbler
2. Bluebird.

4. White Throated Sparrow.
5. Baltimore Oriole.

7. Cardinal Bird.
8. House Wren.

Europe wooden shoes are made of it. The bark is whitish in color, smooth and shining, separable in thin sheets or layers. The fruit is cone-shaped, and the seeds are flat and winged, thus easily scattered by the wind (see SEED DISPERSAL).

In some countries birch bark is made into hats, shoes, boxes and other small articles. Fishing-nets and sails are steeped with birch bark to preserve them. The sap, which may be drawn from the tree during warm weather in the end of spring or beginning of summer, is so sweet that an agreeable wine is made from it in Central Europe. The *dwarf birch*, a low shrub not more than two or three feet high at most, is a native of the north.

In North America the *white* or *paper birch* is a fine tree, with valuable, close-grained wood. It was from the bark of this tree that Indians made their birch canoes, and the thin, clean layers of the bark have been used instead of paper to write upon. The *yellow birch* is a large tree with yellowish bark.



BIRDS, the only feathered creatures of the animal kingdom. They belong to the back-boned or vertebrate group, are warm-blooded, and most of them can fly. Because of their varied and beautiful coloring, their gift of song and the gentle nature of the majority, birds are perhaps the best loved by mankind of any group of animals. It is true that some species, like the hawk and the vulture,

have seemingly no lovable qualities; there are birds, too, of ugly shape and plumage, and there are birds which utter harsh cries instead of singing notes. Yet, to the average person, the word *bird* brings altogether pleasant associations—thoughts of a graceful bright-hued form flitting through the trees, of a nest of tiny creatures fed by devoted parents, of a chorus of woodland songsters. In some respects birds are the most interesting animals one can study, and practical suggestions along that line will be found in this article.

Their Place in the Animal World. Birds are more related to the various species of reptiles than to the mammals; they are classified between the two. The great naturalist,

Huxley, found in birds and reptiles so many points of similarity that he classed the two in one group, the *Sauropsida*, which he termed a super-class of vertebrates. (The word *Sauropsida* means "having the appearance of a lizard.") This group he very learnedly compared with the amphibians and fishes, on the one hand, and the mammals, on the other. Members of this group possess either scales or feathers. Naturalists quite completely concur in the views of Huxley; there is no doubt that birds have an ancestry that is reptilian.

If birds were distinctly reptilian in the early life of the world, it is reasonable to assume that it can be proved they once possessed attributes that we associate with the familiar reptiles of today. They are toothless now, but once had teeth, at least rudimentary in character; before the developing processes of evolution they had four feet that were lizardlike, and they had more or less well-developed claws. Proof of these circumstances was found in the skeletal forms of the *archaeopteryx* (*ahr ke op'te riks*), known now only as a fossil bird. It is known as a reptilian bird of the Mesozoic Era (see GEOLOGY), and was the first specimen known to possess the characteristics of both bird and lizard. (See the article *ARCHAEOPTERYX*.)

Habits. Birds usually live in pairs, rearing their young in homes which they make themselves, though there are some remarkable exceptions to this rule. All birds lay eggs from which young are hatched. In the higher orders, such as the robin and meadow lark, the young are naked when they break from the shell and must be cared for and fed by the parents, but in some of the lower species the little ones are covered with tiny hairs and in others covered with a complete suit of feathers before they hatch. In the latter case the young are able to take partial care of themselves very soon after they appear. The grouse, quail and duck are examples of birds whose young are feathered when hatched. The eggs vary in number from two to several dozen, seeming to be proportioned to the dangers the young are to meet, but being practically the same number at every sitting of each species. The eggs which are hatched by heat are sometimes buried in rotting vegetation, or in the sand under the hot sun, but more frequently they are laid in artificial nests or in some natural

receptacle, and are there brooded and kept warm by the body of the female until the chick matures and emerges. This is usually a period of from two to three weeks.

Flight. Nothing is more wonderful than the flight of birds. Their wing power is extraordinary, but the speed with which they fly has doubtless been exaggerated. Their endurance is much more surprising. Some of the smallest and apparently feeblest of birds, that usually confine their flight to short dashes from bush to bush, may during their migrations cover in a single flight distances ranging from 500 to 2,000 miles. In order that the body, relatively so heavy, may be carried through the air, the muscles which move the wings must be very strong and have a strong frame for their attachment. The frame is furnished by the wide breast bone. But strong muscles alone would be insufficient were there not in the body air cavities, which sometimes extend even into the bones and feathers.

The wings, which are the chief organs of flight, are modified fore limbs, corresponding to the arms of a human being. From the body of the wings grow strong feathers with heavy quills, making a broad surface with which the bird can beat the air. The heavy quills are covered both above and below with short feathers, which prevent the air from passing through. The tail does not help much in flight, but it is rather a rudder by which the bird steers itself and holds its body level. The feathers which cover the entire body are small and overlap, but they do not grow uniformly everywhere, being distributed in certain definite patches or areas.

Food. The food of birds varies widely according to the species. No living bird has teeth, but the beak of each species is fitted to handle the food which it eats. No arrangement provides for the chewing of the food, so the bird's organs of digestion are peculiar. After the food is swallowed it finds lodgment first in the *crop*, a large sack at the bottom of the gullet. Here the food is soaked and softened for some time. It is passed on to the *gizzard*, a kind of stomach, with exceedingly strong muscular walls and tough, hard, wrinkled lining. Here the food is ground fine by vigorous rubbing, sometimes aided by small pebbles and gravel eaten by the bird. Naturally the meat-eating birds have smaller *gizzards*, with thinner muscular coats, and in some species there is

no *gizzard* at all. The quantity of food required by birds is enormous, and in this necessity lies their chief value to the horticulturist.

Senses. Their sense of sight is keen, and in some species it is little less than marvelous. The eye is very much like that of a human being, but it has a third lid, which can be drawn at will so as partially to shut out the light. The nostrils open through the upper part of the beak, and in some birds the sense of smell is exceedingly keen. Although birds have no external ears, yet most of them are extremely sensitive to sound. The senses of taste and touch are dull, yet both are possessed by the bird. While not a large number of birds can be said to sing, yet songs are among the most pleasing and attractive of their characteristics. Some are able to utter only discordant, disagreeable notes, but others, like the crow, seem to have developed a language of their own, and not a few can be taught to speak words. Ordinarily, only the male birds can sing, and those which are most brilliant in plumage are the poorest singers. In general, the singing birds are small and lively, living principally upon grains and fruits. A remarkable trait of birds is their instinct for returning directly to their homes after having been away, as may be seen in the return of the homing pigeon and the return of many species from the winter migration to old homes in the north.

Lessons on Birds

General Suggestions. 1. An eminent authority on nature study says: "The way to a bird's heart is through its crop." Success in bird study depends upon our ability to approach the bird, and birds can be tamed only by feeding them. Some of the first lessons should be devoted to giving instructions about feeding and taming birds.

2. To be successful in this work, the teacher must have a much more extended knowledge than it will be possible to use in class. She must know the size, color and song of the bird, and be able to distinguish between the male and female, and in addition to these facts she must know the bird's habits, its haunts, what it feeds upon, how it apprehends its food, when and where it nests, when the young appear, how long the fledglings remain in the nest and the dangers they are subject to when they leave the nest. The teacher should be able to show the chil-

dren how they may assist the young birds in escaping these dangers. At this stage many birds perish from the want of proper care. Moreover, only young birds can be tamed.

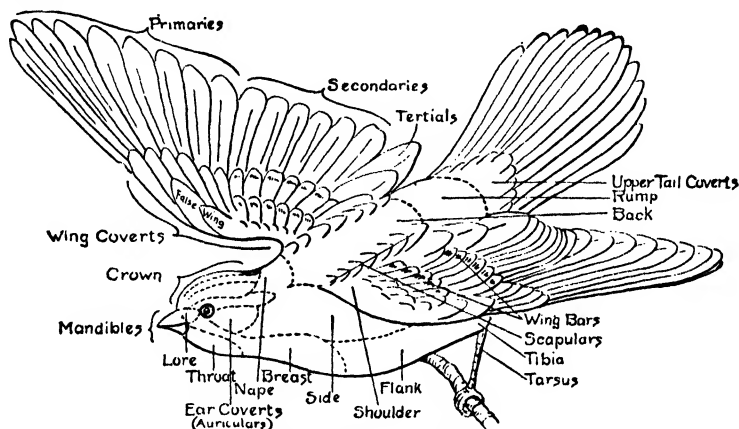
3. Bird study is preëminently an outdoor exercise, and but little time can be profitably spent upon it in school.

4. Time spent in class should generally be devoted to hearing reports and giving directions for further observations. When the study of a bird has been carried far enough for a review, this should be given as a class exercise. The review should then be written, thus furnishing a good drill in language.

the pupils make their observations alone or in companies of not more than two or three. Birds are easily frightened by noises or by the approach of any living thing that they consider an enemy. Your directions should include the following points:

a. In studying birds one should wear clothing of a dull color. Shades of brown which harmonize with the color of the ground and trunks of trees are the most desirable. White and bright colors which attract attention should not be worn.

b. One must move quietly and cautiously, taking the greatest care not to frighten the bird. In general, the bird can be approached



PARTS OF A BIRD

5. Valuable information relating to the study of birds will be found in these volumes in the articles *Egg* and *Nest*, and in those describing the different birds, such as *Bobolink*, *Robin*, *Swallow*; the color plates *Common American Songsters* and *Orders of Birds*; *Birds' Eggs*, with the article *Egg*, and *Birds' Nests*, with the article *Nest*, will give both teacher and pupils excellent ideas of the color and form of the objects illustrated. These articles and color plates should be frequently consulted.

Directions for Observations. 1. All children are interested in watching for the return of birds in the spring. Ask them to report the first birds they see. Keep a record of these reports, as follows:

The first crow, March 1.

The first robin, March 10.

Besides the school record, each pupil should keep a record for himself. Give complete and careful directions for observing birds. This work is usually more successful when

more successfully if the observer pretends not to see it and appears to be in search of something else.

2. Insist upon careful observation and train pupils to describe only what they see. It is very easy to imagine that we see what we are looking for, even when it is invisible.

3. The opera glass is a convenience but not a necessity, but some work, such as Chapman and Reed's "Bird Guide" or Chapman's "Handbook of the Birds of Eastern North America" is indispensable. Two or three books of this type should be in every school library.

4. Pupils should carry pocket notebooks in which to record their observations on the spot. Otherwise some valuable points will be omitted.

Parts of a Bird. The diagram above shows the parts of the bird, with the names attached. Since the terms there used are found in all bird books, the pupils should become familiar with them, but with the young-

BIRDS

GENERAL

1. Birds usually live in pairs, rearing their young in homes which they make themselves.
2. All birds lay eggs from which young are hatched.
3. The young of the hugher orders are naked when they break from the shell; some of the lower species are covered with hair or a full suit of feathers.
4. Some of the smallest birds, in their migrations, may cover in a single flight distances ranging from 500 to 2000 miles.

THE SEVEN ORDERS

Order	Members	1. Raptors, Birds of Prey	2. Insessores, Perchers.	3. Scansores, Climbers.	4. Rasores, Scratchers.	5. Cursorers, Runners.	6. Gallatores, Waders.	7. Natatores, Swimmers.
	Eagle, vulture, hawk, owl.	The most numerous. All singing birds.	Parrot, woodpecker, toucan.	Fowl, grouse, pheasant, pigeon.	Ostrich, emu, cassowary.	Crane, heron, snipe, sandpiper.	Duck, goose, gulls.	

1. Birds of Prey.

- a. The eagle. The noblest and most courageous of birds. Ascends higher than any other bird.
- b. Hawk. Fish hawk. Feeds on fish. Nests in high trees and cliffs.
- c. Vulture. Usually cowardly. Great powers of vision. Valuable scavengers. Gorge themselves eating.

2. Perchers. The most numerous group. Muscles so arranged as to prevent their falling while asleep. When sitting the toes are bent and cannot be opened until the bird rises.

3. Climbers. About 360 species.

- a. Parrot. Some known to live 90 years. South American parrot the talker.
- b. Woodpecker. Tongues long, slender, with a barbed horny tip. Tap trees for insects. The sapsucker bores holes around the tree.

c. Toucan. Noted for its enormous bill. Live in flocks, one acts as watchman. Are easily tamed.

4. Scratchers. Cock and hen familiar examples.

Grouse.

Nests on the ground. The young leave the nest almost as soon as hatched.

Pheasant. Not natives of United States. The common pheasant a native of Asia.

Prized for their beauty.

5. Runners.

- a. Ostrich. Largest of birds. Male stands 7 or 8 feet. Timid bird. Has great speed. In captivity male and female sit upon the eggs in turn.
- b. Emu. Australian bird. Feet three-toed. Kicks with great force.
- c. Cassowary. Native of New Guinea. Stands five feet. Feathers like long hairs. Cannot fly, but a great runner.

6. Waders.

- a. Crane. Long neck and stil-like legs. Lives in marshes. After eating stands on one foot dozing

b. Heron. Lives in swamps and along shallow rivers. Found everywhere.

c. Snipe. Narrow long bill, eyes set far back. Flies in a zigzag way when aroused.

d. Sandpiper. About 30 species. Search mud for worms. Change their plumage with change of seasons.

7. Swimmers. Web-footed.

- a. Duck. Deep-sea duck dives to great depth for food.
- b. Goose. In the spring fly in V-shaped flocks. Return south as cold approaches.
- c. Gulls. Live along sea-coast and waters of the interior. Catch fish and follow ships, feeding on all kinds of flesh.

Peculiarities



ORDERS OF BIRDS

Scratchers

- 1 and 2, Domestic Fowls.
3, Golden Pheasant.

Climbers

- 4, Woodpecker.
Birds of Prey

Perchers

- 6, Bobolink.
Runners

Waders

- 8, Sandpiper
9, Heron.

Swimmers

- 10, Swan.
11, Domestic Duck.

Additional Outline on Birds

- I. GENERAL DESCRIPTION
 - (1) Size and shape
 - (2) Feathers
 - (3) Flight
 - (4) Endurance
 - (5) Development of the senses
 - II. ANATOMY
 - (1) Skeleton
 - (2) Muscular system
 - (3) Organs of sense
 - (4) Organs of circulation
 - (5) Respiratory organs
 - (6) Digestive organs
 - III. CLASSIFICATION
 - (1) Birds of prey
 - (a) Buzzard
 - (b) Condor
 - (c) Eagle
 - (d) Falcon
 - (e) Hawk
 - (f) Kite
 - (g) Owl
 - (h) Vulture
 - (2) Perchers
 - (a) Blackbird
 - (b) Crow
 - (c) Cuckoo
 - (d) Finch
 - (e) Paradise-bird
 - (f) Thrush
 - (g) Warbler
 - (3) Climbers and creepers
 - (a) Parrot
 - (b) Woodpecker
 - (c) Toucan
 - (d) Wren
 - (e) Mouse-bird
 - (f) Trogon
 - (4) Scratchers
 - (a) Bustard
 - (b) Grouse
 - (c) Pheasant
 - (1) True pheasants
 - (2) Turkey
 - (3) Chicken
 - (5) Runners
 - (a) Apteryx
 - (b) Cassowary
 - (c) Emu
 - (d) Ostrich
 - (e) Roadrunner
 - (6) Waders
 - (a) Crane
 - (b) Flamingo
 - (c) Heron
 - (d) Ibis
 - (e) Snipe
 - (7) Swimmers
 - (a) Auk and Penguin
 - (b) Duck
 - (c) Goose
 - (d) Gull
 - IV. BIRDS' EGGS
 - (1) Composition
 - (2) Size
 - (3) Shape
 - (4) Color
 - V. NESTS
 - (1) Position
 - (2) Shape
 - (3) Material
 - VI. SPECIAL CHARACTERISTICS
 - (1) Migrations
 - (2) Song
 - (3) Brilliant plumage
 - (4) Kinds of food
 - (5) Mating
 - (6) Care of the young
- Questions on Birds**
- What characteristic distinguishes birds from other animals?
- Name three kinds of birds already provided with feathers when they are hatched.
- What advantage are feathers to these young birds?
- How is the food of birds digested?
- Can the birds that flit from bush to bush cover long distances in a single flight?
- Why are the muscles which move the wings very strong?
- Why do some of the bones contain air cavities?
- Of what use is the tail in flying?
- What is the wing? How is it formed?
- What is remarkable about the eyes of a bird?
- Which senses are the most acute? Which are dull?
- What kinds of birds are the best singers?
- Do both male and female generally sing?

er children, attention should be called to the most prominent parts only, as head, wings, tail, etc.

1. A live bird, a mounted specimen or the skin of the bird should be compared with the diagram and the children be asked to name the corresponding parts. Let the first lessons be on the parts most easily recognized, as the head, mandibles, wings, legs and tail. Measure the specimen from the point of the beak to the end of the tail.

How long is it?

Spread the wings and measure them from tip to tip. What is the distance?

How does this distance compare with the length?

2. Begin the second lesson with a review of the preceding one to make sure that the pupils remember what they observed. From the review proceed to a study of the more minute parts. Do this in a systematic manner. To illustrate: take first the parts of the body; head, nape, breast, beak and rump. When these parts have been learned, proceed in a like manner with the wings, tail and legs. Classes above the fifth grade should be able to distinguish and name all these parts, and an occasional exercise in connection with the other lessons will enable them to do so.

3. The adaptation of structure to the life of the bird is of special interest. Lead the older classes to see the difference in the beak of a bird of prey and that of one which feeds upon insects and fruit; also the difference in the foot of these birds. Figures 1-9 show the chief types represented in our common birds.

Figure 1, scratchers, such as the turkey, common fowl, grouse.

Figure 2, pigeon and doves.

Figures 3 and 4, birds of prey, such as the hawk, owl, buzzard.

Figure 5, parrots.

Figure 6, cuckoos and kingfishers.

Figure 7, woodpeckers.

Figure 8, swifts and humming birds.

Figure 9, perching birds.

Protection of Birds. The chief purpose of these lessons should be to increase the children's interest in and love for birds, to impress upon them the value and importance of the birds to the farmer and gardener, and to enlist their services in protecting the birds and in inducing them to return to the same nesting places from year to year. The following are some of the means that can easily be employed to this end:

a. Encourage the children to feed the birds especially when they first return in the spring, and to provide them through the season with plenty of fresh water. A running fountain in the garden or yard, at which they can drink, is always a source of attraction to them. In nearly every locality there are

birds which remain through the winter, and by feeding these regularly they are induced to remain about the buildings and yard and become quite familiar.

b. Provide nesting places. Any small



Fig. 1.



Fig 2



Fig 3



Fig 4



Fig. 5

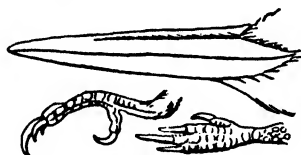


Fig 6.

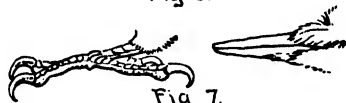


Fig 7.



Fig 8.



Fig 9

structure which provides shelter from the sun and storms and is in a convenient place will attract the birds as a suitable place in which to build a nest. The illustration on next page shows a number of structures for bird houses, any one of which can easily be constructed by a boy who can use a hammer and saw.

c. Protecting young birds from cats and other enemies and also seeing that they are fed. Often young birds accidentally fall from their nests long before they are able to fly. In such cases it is wiser to return the bird to its nest, as it is so helpless that it needs the care of its parents. Many of these birds, too, are practically helpless when they first leave the nest, and in this condition easily fall a prey to cats or other animals which feed upon them. These young birds have not learned to feed themselves when they leave the nest, and unless fed by the parents, many of them perish from starvation. If the young bird found in this condition is approached carefully and fed, it is at once



BIRD HOUSES

tamed, but if frightened at the first approach of the children, it is probable that it can never be tamed. Older birds with a broken wing or leg are sometimes found by children. The broken member should be bound tightly so that it will heal in position, and the bird should be protected from cats and other enemies until it is strong enough to fly away. No better work to give children practice in patience and gentleness can be found than that of looking after and caring for these helpless fledglings. In this there is also opportunity for study.

Bird Reservations are tracts of land, particularly islands and marshy reaches along rivers and shores, set aside by the government as retreats for native wild birds, where they can nest in safety, secure from the depre-

dations of hunters. The first reservation in the United States was established by President Roosevelt in 1910, when he set aside Pelican Island, Indian River, Fla., as a home for the pelicans that nested there. When he retired from office fifty-three reservations had been established, and since then many others have been organized; there are now in excess of ninety, widely scattered. They are located in all parts of the American domain, from Porto Rico on the south and east to Alaska on the north, along the Gulf and Atlantic shores, midland in Nebraska and South Dakota, westward in Oregon; while in mid-Pacific is the Hawaiian Island Reservation, the largest of America's bird sanctuaries.

Bird Migration. This absorbing subject is illustrated in the drawings and maps which appear in these volumes, and is discussed in the subject of *MIGRATION OF ANIMALS*.

Bird Laws. For a number of years laws in opposition to the indiscriminate hunting of birds have been passed by state and provincial legislatures. Such legislation is based on economic grounds, with reference to the benefit to agriculture of insect-eating birds, and on sentimental grounds. It is rightly felt that the birds, with their beautiful coloring and sweet voices, add too much to the joy of life to be ruthlessly slaughtered for the game market, for sport or for the millinery trade. The McLean Act of 1913 gives the United States government control of all migratory and game birds that do not remain permanently within the boundaries of one state, and the Department of Agriculture is given the power to issue rules in regard to closed seasons, bird zones, etc. In 1915 about 240 state laws regarding bird protection were passed. The Underwood Tariff Law of 1913 had a provision prohibiting the importation of bird skins or feathers into the United States, and other protective measures have followed.

Bird Day, a day set apart in Canada and the United States for special exercises in the schools. Its object is to teach the pupils the importance of protecting the birds. Bird Day was first observed in the public schools of Oil City, Pa., May, 1894. A circular on the subject of bird protection was issued two years later by the United States Department of Agriculture. No special date has been chosen, but the schools in any locality are urged to select a day suitable for that region.

Wonder Questions About Birds

Why do some birds wear brilliant plumage and others sober colors?

Coloration among birds usually bears an important relation to their habits and mode of life. Certain birds which nest on the ground and are preyed upon by various enemies have plumage which so blends with the background of weeds and grasses that the birds are rendered inconspicuous. This is an example of protective coloration, or natural "camouflage." Some of the plovers and sandpipers wear such a plumage during the summer months, and in winter change it for a garment that blends with the shores and beaches. Tanagers, toucans, parrots and many other brilliantly-colored birds which live in trees are less exposed to danger than ground-nesting birds, and it is supposed that the former rely on their native haunts for protection. There is another theory that some naturalists accept. It has been noticed that the males of many species which have bright plumage are poor singers, while many dull colored birds are famous songsters. From this it is argued that the soberly-clad male woos his mate by his sweet singing, while his more handsome brother relies on his gay feathers. This is a subject that ought to prove of special interest to those who enjoy bird study and observation.

Why do birds eat so much?

Did you ever try to feed a family of orphan baby robins? One bird lover who did so reported that each bird ate forty-one per cent more than its own weight in twelve hours. At this rate man would eat about seventy pounds of flesh a day, and drink five or six gallons of water. Anyone who has observed birds to any extent will agree that they seem to be eating all day long. The reason for this is that they are exceedingly active and very warm blooded, and they need an extraordinary amount of food to sustain their high temperature and bodily activity. Nature has made incessant eating possible for them by giving them adequate digestive powers. The reports of various naturalists show that the voracious appetites of birds have a distinct economic value. In the stomach of a single cedar waxwing were found one hundred canker worms; a scarlet tanager was observed to devour 630 gypsy moth caterpillars in eighteen minutes; a Maryland yellow-throat ate plant lice at the rate of over 5,000 an hour. Birds also devour weed seeds, field mice and refuse. It is evident then that the help they give the agriculturist far offsets the damage they may do to fruit and grain crops.

How can birds hear, when they have no ears?

Birds have no visible ears, but they possess an internal apparatus that enables them to hear acutely. Robins seem to listen for the sounds made by crawling worms, and woodpeckers can detect by sound the presence of the grubs of boring snails. A word uttered in a low voice or the crackling of a twig will throw a whole flock of birds into an uproar. The tufts of feathers on the heads of such birds as the screech owl are not ears, though they are sometimes mistaken for organs of hearing. It is interesting to know that birds not only hear acutely, but they can distinguish between different tones and pitches.

Do birds talk to one another?

There is no doubt but that birds communicate with one another through various kinds of notes. Numerous species have a special call note which summons the individuals to form into a flock, and when flocks are making their way to another climate, the call note is sounded again and again to keep the line unbroken. Calls of alarm and of hunger are uttered by young birds of a number of species. Some birds are able to convey to their young, by means of certain notes, the fact of threatening danger and a warning to keep very quiet. This gift of language is more highly developed in some species than in others. The crows and jays, for example, have a really extended vocabulary, while the cormorants and water turkeys make only a few elementary sounds. In the case of the former there is a regular development of the range of notes from the nesting period to maturity.

How do birds find their way back home when they are thousands of miles away?

There is evidently some special faculty that directs birds over vast stretches of land and water, and causes them to return to the same yard or even the same tree on almost the same date, year after year. It is true that they make use of sight, hearing, memory and the power of association, but this summary does not tell the whole story. Undoubtedly birds possess in a marked degree what we may call a sense of direction. This instinct keeps them on the straight route in the darkness of night and where familiar landmarks are lacking. Homing or carrier pigeons have this sixth sense developed to a remarkable degree.

What repulsive animals were the birds' first ancestors?

Strange as it may seem, the beloved songsters of our woods are descendants of the reptilian class, to which belong the most hated of all animals. Ages ago there existed reptiles which could fly, and the first bird had reptilelike claws, toothed jaws and a long, lizardlike tail. Its front limbs, however, were adapted for flying, and the animal was covered with feathers. Modern birds and modern reptiles have many points in common in respect to structure. But how far apart they are in the affection they awaken in human hearts!

How fast do young birds grow?

They grow at a rate quite out of proportion to their size. One naturalist tells of a cedar waxwing that doubled its weight the first day, trebled it on the second, and almost quadrupled it on the third. On the twelfth day, when it left the nest, it had increased its weight thirteen-fold. He adds, "At a corresponding rate of growth, a ten-pound baby would weigh 134 pounds at the age of twelve days." This astonishing rate of growth keeps the parents constantly occupied to find food to satisfy the increasing appetite.

Do birds use their wings for anything besides flying?

Yes, the wings of birds serve a variety of purposes. Penguins, Arctic birds that find it easier to swim than to fly, use their short wings in the water as oars; on land, the wings serve as forefeet when the penguins crawl on the ground. The young of numerous birds are gathered under the parents' wings when the little ones need shelter or protection, and frequently the mother bird spreads her wings over the nest to guard the eggs. Fighting birds, including aggressive domestic poultry, find the wings a strong weapon of attack. Birds also give vent to various emotions by flapping, spreading and fluttering the wings. Everyone, too, is familiar with the bird's habit of tucking its head under its wings when it goes to sleep.

How high in the air do migrating birds fly?

The height at which birds travel at such times varies from a few yards to nearly three miles. We know that the calls of traveling birds may be frequently heard at night, and that in the daytime migrating flocks are often visible, so it is reasonable to suppose that a good many birds seek only moderate altitudes. Another evidence of this is the large number of birds that

are killed at night through striking against obstacles. On the other hand, observers who have watched migrations through telescopes report that numerous birds fly so high one cannot discern them with the naked eye.

Do birds put away stores of food like the squirrels?

No, birds very rarely store up supplies for the future. In fact, they seem to spend most of their time searching for food to satisfy present demands. In tropical regions food is abundant the year round, and there is no occasion for storing it up; in less favored localities the bird inhabitants leave when the food supply gives out, and migrate to warmer climes.

Why do birds return to their northern homes in the spring?

One might think that the birds would prefer to remain in the sunny Southland all the year round, where the food supply is never endangered by ice and snow. We must remember, however, that if all the birds built nests and reared their families in the same part of the world the warm regions would be so thickly populated with birds that even there the food supply would run short. And, just as human beings emigrate from crowded countries to new and unsettled lands, so birds keep the southern regions from becoming overcrowded by their yearly journeys northward.

How do birds keep their balance when on the wing?

Birds have a special organ of balance which keeps them from falling over when they are flying. This organ consists of semicircular canals in the head; the canals are filled with a fluid that communicates with delicate nerve fibers, and the fibers are the ends of a nerve of balance. Human beings have a similar organ in the head, and when it is not acting normally they may lose their equilibrium. In birds the organ of balance is highly developed.

How does it happen that some birds, such as the ostrich and emu, cannot fly?

It is probable that the flightless birds of today are the descendants of birds which originally could fly, but lost that power through not exercising it. Birds which had to escape from swift, powerful enemies developed great powers of flight, while others had no need to exercise their wings. In course of time the wings lost the power of carrying the birds in the air, and the latter became flightless.

In some cases the programs for Bird Day and Arbor Day are combined.

Bird Books. Recent years have seen the publication of a large number of very interesting books on the subject of birds, some of them dealing principally with their habits and manner of life, while others give simple descriptions of the birds in such a way that a person may name them on sight. Not a few of these books are beautifully illustrated with colored pictures, which show vividly the striking characteristics of the birds. Besides the local books which deal with the birds of the regions around large cities or in certain restricted localities, there is a standard book covering a wide area that is worthy of recommendation: it is Chapman's *Birds of Eastern United States*. Clark's *Studies in Bird Migration* and Allen's *Book of Bird Life* and Beebe's *The Bird* are valuable for reference. Olive Thorne Miller's *Bird Ways, In Nesting Time* and *Our Home Pets*, Mabel Osgood Wright's *Bird Craft* and *Citizen Birds*, are books of a different type that are charming reading.

Related Articles. Consult the following titles for additional information:

BIRDS OF PREY

Buzzard	Kestrel	Secretary Bird
Condor	Kite	Shrike
Eagle	Lammergeier	Turkey
Falcon	Marsh Hawk	Buzzard
Goshawk	Owl	Vulture
Hawk		

CREEPERS AND CLIMBERS

Cockatoo	Macaw	Toucan
Creepers	Parakeet	Woodpecker
Flicker	Parrot	Wren
Lory	Quetzal	Wryneck

FISHING BIRDS

Booby	Darter	Frigate Bird
Cormorant	Fish Hawk	Pelican

PERCHERS

American Goldfinch	Curassow	Oriole
Baltimore Oriole	Dickcissel	Ortolan
Bobbird	Dippel	Oven Bird
Bird of Paradise	Finch	Pipit
Blackbird	Flycatcher	Raven
Bluebird	Goldfinch	Redstart
Bobolink	Grackle	Robin
Bower-bird	Grosbeak	Rook
Brown Jay	Halcyon	Snowbird
Thrasher	Hoopoe	Sparrow
Bullfinch	Indigo Bird	Starling
Bunting	Jackdaw	Stone Chat
Canary	Jay	Sunbird
Cardinal Bird	Junco	Swallow
Catbird	Kingfisher	Tailor Bird
Chaffinch	Kinglet	Tanager
Chat	Lark	Thrush
Cowbird	Linnit	Titmouse
Crossbill	Magpie	Umbrella Bird
Crow	Martin	Vireo
Crow Blackbird	Meadow Lark	Wagtail
Cuckoo	Mocking Bird	Warbler
	Nightingale	Waxwing
	Nutcracker	Weaver Bird
	Nuthatch	Wood Pewee

PIGEONS

Carrier Pigeon	Pigeon
Dove	Turtle Dove
Passenger Pigeon	

RUNNERS

Apteryx	Emu	Rhea
Cassowary	Ostrich	Road Runner

SCRATCHERS

Bustard	Lyre Bird	Prairie Chicken
Grouse	Mound Bird	Platymagan
Guan	Partridge	Quail
Guinea Fowl	Peacock	Tragopan
Jungle Fowl	Pheasant	Turkey

SEA BIRDS

Albatross	Gull	Scissorsbill
Fulmar	Kittiwake	Tern
Gannet	Petrel	Tropic Bird

SWIMMERS

Auk	Duck	Merganser
Brant Goose	Eider Duck	Penguin
Canada Goose	Gadwall	Puffin
Canvasback	Gallinule	Shoveler
Coot	Goose	Swan
Diver	Grebe	Widgeon

WADERS

Adjutant	Jabiru	Sandpiper
Avocet	Jacana	Snipe
Bittern	Lapwing	Spoonbill
Crane	Night Heron	Stilt
Curlew	Oyster Catcher	Stork
Egret	Plover	Turnstone
Flamingo	Rail	Woodcock
Heron	Ruff	Yellowlegs
Ibis	Sanderling	

WEAK-FOOTED BIRDS

Goatsucker	Swift
Humming Bird	Whip-poor-will
Night Hawk	

MISCELLANEOUS TOPICS

Aviary	Nature Study
Egg	Nest
Migration of Animals	

BIRDS' EYE MAPLE. See MAPLE.

BIRDS' NESTS. See NEST.

BIRDS OF PARADISE, the familiar name for a family of birds noted everywhere for the splendor of their plumage. About forty species live in Australia, New Guinea and the other islands of the Pacific. They live almost entirely in the tree tops, eating seeds, fruits and insects and building their rather flimsy nests. In all species the plumage of the male especially is brilliant and velvety, but it is not alone in brilliancy of color that the birds of paradise are remarkable. The males have wonderfully long and graceful plumes, which in some species grow from the shoulders, in others from the tail or from the head. In one species the shoulder tufts are so long and fine that they fall far below the body, and even below the tail, in a showery mass of brilliantly colored, delicate, threadlike feathers. The plumes of the tail in one species are long, slender quills which on the very tip bear a small rounded vane.

It is difficult to describe the varieties in feathers or the tints and shades of color to be found, even on a single bird, and it is quite impossible to give any idea of the varied and brilliant family. The smallest are about the size of the sparrow, and the

largest are nearly as big as a crow. The males often gather together in some tree and give peculiar dances, fluttering their gorgeous plumes to attract their mates. It is at this time, when the birds are excited by their performances, that the native hunters kill them for the market. A humanitarian movement to restrict the slaughter of these lovely creatures is spreading throughout the

of the state, nearly as large as the next nine cities combined. The growth of Birmingham has been rapid, and is due to the great iron and coal industries which center there. It is nearly 100 miles northwest of Montgomery, and has nine lines of railroad—the Central of Georgia, the Louisville & Nashville, the Mobile & Ohio, the Seaboard Air Line, the Atlanta, Birmingham &



TWO OF THE BIRDS OF PARADISE

world, and the importation of their plumage, or that of any other wild birds, into Canada and the United States is forbidden.

BIRDS OF PREY, a class of carnivorous (flesh-eating) birds, so called because they obtain their food by chasing and capturing other animals. As a rule the birds of prey are powerful flyers, and are provided with strong, sharp beaks and catlike claws. Among the typical members of this group are the eagles, vultures, fishhawks, falcons and owls; all are described in these volumes.

BIR'KENHEAD, ENGLAND, an important city on the Mersey River, opposite Liverpool. It has great docks covering 165 acres and some of the world's largest floating docks. The town owes the beginning of its growth to Messrs. Lairds' shipbuilding yards, which constructed the famous *Alabama* (which see) for the Confederate States of America. The Mersey Tunnel, called "Queensway", connects Birkenhead with Liverpool. The public utilities—street cars, ferries to Liverpool, gas and electric lighting and water-works—are owned by the city; the two first named are leased to operating companies. Population, 1931, 147,946.

BIR'MINGHAM, ALA., founded in 1871 by the Elyton Land Company, is the county seat of Jefferson County and the largest city

Atlantic, the Southern, the Frisco, the Illinois Central and the Alabama Great Southern. There are also many interurban lines.

Industries. There are three famous coal fields near Birmingham, the Coosa, the Warrior and the Cahaba. Red Mountain, running parallel with Jones valley, in which the city is located, is a great mass of hematite, a red, fossiliferous ore of iron. The great coal center in Pennsylvania extends directly southwest into Alabama and there expands; Birmingham is in the center of the Alabama field. Besides, there are immense deposits of limestone. The continued importance, rapid growth and prosperity of the city seem therefore assured.

The industries connected with iron, coal and limestone dominate business life; a large part of the nation's export of pig iron is from the Birmingham district. There are also important cotton interests; the city is a great yellow-pine market; and there is large production of fertilizer, textiles, cement and clay products, the neighborhood possessing valuable clay beds. The improvement of the Warrior River, and the completed canal from the city to the river, sixteen miles distant, give Birmingham direct water transportation to the Gulf; it is an inland seaport.

Buildings. There are several buildings from ten to twenty-seven stories high. The Federal building represents an expenditure of \$2,000,000; the courthouse \$3,000,000; a terminal station cost \$2,000,000; two hotels cost not far from \$1,000,000 each, and the city has a total of eight hospitals, as well as Jefferson County almshouse and Mercy Home. Within the limits of the city are located Howard College (Baptist) and Birmingham College (Methodist). The people of the city voted three million dollars in bonds for the erection of new public school buildings; with the completion of this program, the schools of the city are among the best equipped in the South.

Greater Birmingham. In 1910 a law became effective which materially extended the city limits. The suburbs of North Birmingham, Avondale, East Lake, Woodlawn, Wylam, Pratt City, Elyton, Ensley, West End and East Birmingham were added to the city, which is under the commission form of government, with three commissioners elected by the people. Population, 1920, 178,270; in 1930, 259,678, a gain of 45 per cent. Including its suburbs, the population of the city is estimated at 300,000.

BIRMINGHAM, ENGLAND, one of the most important cities of the United Kingdom, situated between London and Liverpool, 103 miles northwest of the former city and seventy-eight miles southeast of the latter. It is England's chief manufacturing city, the industries representing many lines of commerce, but particularly iron, steel and brass products. Among the leading manufactures are engines, motors, railway cars, guns and machinery of all kinds. The city is second only to Croydon among English towns in the manufacture of automobiles.

Schools for higher education are numerous, and there are several strong technical schools. In connection with a great art school there is a large art gallery, open to the public. The city owns the street railways, and they are operated under lease. To within about fifty years Birmingham was unsanitary, but such conditions as then existed among the toilers have been vastly improved. Of all the cities of England, only one—London—is larger. Population, 1931, 1,002,413.

BIRNAM WOOD, a hill in Perthshire, Scotland, formerly covered with trees, and memorable because of its association with

Shakespeare's *Macbeth*. In that play Macbeth is told that he will never be defeated until Birnam Wood shall come to Dunsinane. His enemies covered themselves with boughs and marched from the hill, thus making it seem that the wood did actually move. The hill has been stripped of its trees since Shakespeare's time. It is 1,324 feet high, and is twelve miles northwest of Perth, overlooking the valley of the Tay.

BIRNEY, JAMES GILLESPIE (1792-1857), an American reformer, born in Danville, Ky. He was graduated at Princeton in 1810, studied law and began practice in Danville in 1814. He soon removed to Alabama and served in the legislature of that state, but gradually turned his attention to the study of the slavery question and became the leader of the conservative wing of the Abolitionists. In 1833 he returned to Danville, freed his own slaves and from that time forward devoted himself to the cause of gradual emancipation. He organized the Kentucky Anti-slavery Society in 1835, and in the following year moved to Cincinnati and issued the first number of an anti-slavery paper. During the next few years he often suffered from the violence of mobs. In 1840 and again in 1844 he was the candidate of the Liberty party for the Presidency, but received few votes. The last twelve years of his life he was an invalid.

BIRTH REGISTRATION, or the recording of births, has for centuries been compulsory in Europe. Though most of the states of the American Union have laws requiring that every birth be registered, these laws have not been faithfully administered except in not more than twenty of the commonwealths. With the organization of the Children's Bureau in 1912 a decided impetus was given to the movement for registering births. It was pointed out that satisfactory statistics of infant mortality, serving as a guide to health conditions, cannot be obtained without a well-organized system of registration; laxity in recording births also interferes with the proper administration of child-labor laws.

The infant welfare movement, of which birth registration is a part, also received special attention after the entrance of America into the World War, for the number of men rejected for physical reasons by the exemption boards emphasized the need of improving health conditions in early life. It is

true that although nearly all the states have passed birth-registration laws, the regulations imposed are not strictly enforced in all of them.

In Canada the registration of births is under provincial control, and each province has its own method of administering the recording of births.

BIRTHSTONES, precious stones which have been sentimentally associated with the months. Each stone in the group is the birthstone of the persons who were born in the month with which the particular gem is connected. The custom of thus assigning certain stones to certain months may have some connection with the twelve stones of the high priest's breastplate (see *Exodus* XVIII, 15-20), but the actual practice of wearing birthstones began in Poland in the eighteenth century. Below is the list of birth stones adopted officially by the American National Retail Jewelers' Association:

January.....	Garnet
February.....	Amethyst
March.....	Bloodstone or aquamarine
April.....	Diamond
May.....	Emerald
June.....	Pearl or moonstone
July.....	Ruby
August.....	Sardonyx or peridot
September.....	Sapphire
October.....	Opal or tourmaline
November.....	Topaz
December.....	Turquoise or lapis-lazuli

BISBEE, *biz'bee*, ARIZ., founded in 1877 and now the fourth city in size in the state, is located in Cochise County, eight miles from the Mexican border and 252 miles west of El Paso, Tex. It is in a copper-mining district, and 5,000 miners are employed in the vicinity. A branch of the Southern Pacific Railroad serves the city. There is a public library, a Y. M. C. A., a Y. W. C. A. and an Elks' Club. Population, 1930, 8,023.

BISCAY, *bis'kay*, BAY OF, a great indentation of the Atlantic Ocean which lies between the projecting coasts of France and Spain, and extends from the French island of Ushant to Cape Ortegal. The length and breadth are about 400 miles. It receives the rivers Loire, Charente, Adour and Gironde. The principal ports on the bay are Nantes, Bordeaux, Bayonne, San Sebastian and Gijon. The tides here are among the highest known, and navigation is very difficult.

BISHOP, *bish'up*, the title of an overseer or superintendent over a number of local churches, which constitute his diocese. The

Anglican, Roman Catholic, Greek and some other Eastern churches consider the office of bishop to have descended in an unbroken line from the twelve apostles. Most Protestant denominations, however, do not accept this order of succession. The Methodist Episcopal Church recognizes the authority of a bishop, but not an ecclesiastical supremacy. In this church the office is elective, and bishops are placed upon the retired list by vote of the general conference. The duties of the bishop vary with different denominations. In general, the bishop has oversight over the clergy and various church interests within his diocese. He may call conventions of the clergy, at which he presides, appoint clergymen to churches and for cause may remove them from their positions.

BISMARCK, *biz'mark*, N. D., the fourth city in size in the state, the state capital, and the county seat of Burleigh County. Fargo is 194 miles east. It is on the Northern Pacific and the Minneapolis, Saint Paul & Sault Ste. Marie railroads, and it is a station on two transcontinental air routes; the local airport is in all respects modern. Water transportation on the Missouri River reaches westward to Fort Benton, Montana, 1,500 miles upstream. There are numerous buildings of prominence; among them are the new State Capitol, costing \$2,000,000; a State Memorial Building; county courthouse; World War Community Building; public library; an armory, and two hospitals. A great vehicular bridge spans the river.

The industries are largely connected with agriculture. There are flour and feed mills, grain elevators, several agricultural implement assembly plants, a twine plant, and important development of flax mills.

Bismarck was founded May 14, 1872, and named for the Chancellor of the German Empire; in 1883 it became the territorial capital, and in 1889 was made the capital of the new state of North Dakota. The state industrial exposition is held here every autumn. The commission form of government was adopted in 1912. Population, 1920, 6,951; in 1930, 11,090.

BISMARCK ARCHIPELAGO, *biz'mark ahr ki pel'a go*, a group of Pacific Islands lying north and northeast of the island of New Guinea and south of the equator. Formerly under a German protectorate, the archipelago was mandated to Australia by the Treaty of Versailles and included in the

Mandated Territory of New Guinea. The islands have an area of 19,660 square miles. The native population of areas patrolled, chiefly Papuans, numbered 139,573 at the 1935 census. The principal islands are New Britain, 14,600 square miles (including adjacent islets); New Ireland, 2,800 square miles; Lavongai, 460 square miles; and the Admiralty and Duke of York groups. The capital, Rabaul, is a port town on the island of New Britain. The chief products are copra, coffee and coconuts.

BISMARCK-SCHONHAUSEN, *bis'mahrk shön'how zen*, KARL OTTO EDUARD LEOPOLD VON, Prince (1815-1898), a German statesman to whose genius is due the founding of the German Empire. He was born at Schönhofen, of a noble family, studied at Göttingen and Berlin and entered the army.

After a brief interval devoted to his estates and to the office of inspector of dikes, he became in 1846 a member of the provincial diet of Saxony, and in 1847 of the Prussian diet. In 1851 he was appointed representative of Prussia in the diet of the German Federation at Frankfurt, where with brief interruptions he remained till 1859, exhibiting the highest ability in his efforts to checkmate Austria and place Prussia at the head of the German states. From 1859 to 1862 he was Ambassador to Saint Petersburg, and in the latter year, after an embassy to Paris of five months' duration, he was appointed minister of foreign affairs and president of the Prussian cabinet. The Lower House persistently refusing to pass the bill for the reorganization of the army, Bismarck dissolved the diet, closing it for four successive sessions until the work of reorganization was complete.

When popular feeling had reached its most strained point, the Schleswig-Holstein question acted as a diversion, and Bismarck, by the skilful manner in which he added the duchies to Prussian territory, checkmated Austria and excluded it from the new German Confederation, became the most popular man in Germany. Prussia now held the chief place in Germany, and as a result a struggle between Germany and France appeared to be sooner or later inevitable. Bismarck, having made full preparations, brought matters to a head on the question of the Hohenzollern candidature for the Spanish throne, and the result was the Franco-German War.

After the successful issue of the war, Bismarck became Chancellor of the new German

Empire, with the title of prince. He formed with Austria and Italy the Triple Alliance, not, he said, with the intention of entering upon further war, but for purposes of defense. Subsequently he alienated the Roman Catholic party by his opposition to the doctrine of the Pope's infallibility, and was for a long time involved in a conflict with the Church. He held his position of Chancellor until March, 1890, when he disagreed with Emperor William II and tendered his resignation.

Related Articles. Consult the following titles for additional information:

Franco-German War	Schleswig-Holstein
Germany	Seven Weeks' War
Prussia	Triple Alliance

BISMUTH, *biz'muth*, a metal of a grayish-white color, slightly tinted with red, used in making pewter and printers' types and in various other metallic mixtures. It is somewhat harder than lead and cannot be worked with a hammer when cold, being so brittle as to break easily into powder. Its internal face or fracture exhibits large shining plates variously disposed. It fuses at 476° F. and expands considerably as it hardens. It is often found in a native state, crystallized in eight-sided forms, or in the form of thin plates in the ores of other metals, particularly cobalt. Eight parts of bismuth, five of lead and three of tin constitute the fusible metal sometimes called Newton's, which melts at 202° F., and may be fused over a candle in a piece of stiff paper without burning the paper. Bismuth forms the basis of a sympathetic ink. The nitrate of bismuth is used as a medicine, while the oxychloride is used as a paint and as a cosmetic, under the name of *pearl-white* or *pearl-powder*.

BISON. See BUFFALO.

BITHYNIA, *bith in'i a*, an ancient country of Asia Minor, stretching along about one-half of the south shore of the Black Sea. It was settled by adventurers from Thrace, and was conquered by King Croesus of Lydia. Later it fell to the Persians, and afterward it was subdued by Alexander the Great. The Bithynian kingdom was founded by Nicomedes I about 278 B. C. and remained independent until 74 B. C. when Nicomedes III ceded it to the Romans, who placed Pliny the Younger as ruler over it. Its chief cities were Chalcedon, Heraclea, Nicaea, Nicomedia and Brusa. In 1298 the Turks broke into the country and conquered it. Brusa was for some time thereafter a

Turkish capital. It now contains no town of importance.

BITTER-ASH. See QUASSIA.

B I T T E R N, the name of several wading birds of the heron family. The common bittern of the United States is a dull yellowish-brown, with spots and bars of black or dark brown. It has a short tail and long and loose breast feathers. It is remarkable for its curious booming or bel-
lowing cry. It



AMERICAN BITTERN

has a great variety of common names, such as miredrum, fly-up-the-creek and stake driver. If wounded the bird flights vigorously. Although it is a harmless and night-hunting bird that lives upon the small animals of the swamps, its peculiar habits and gloomy cry render it unpopular.

BITTERNUT, the swamp hickory, a tree of North America which bears small and somewhat egg-shaped fruits, with a thin, fleshy rind; the kernel is bitter and unpleasant. See HICKORY.

BITTERROOT, a plant of Canada and Northwestern United States, so called from its edible root, which is esteemed as a delicacy by whites as well as Indians. From its tobacco-like odor while cooking, it is called *tobacco root*. From the root, which is long, fleshy and tapering, grow clusters of juicy green leaves, with a fleshy stalk bearing a handsome, solitary, rose-colored flower, rising in the center and remaining open only in sunshine. Bitterroot is the state flower of Montana.

BITU'MEN, a mineral substance composed principally of hydrogen and carbon, and appearing in a variety of forms, which pass into one another and are known by different names. They range from *naphtha*, the most fluid, to *petroleum* and *mineral tar*, which are less so, thence to *maltha* or *mineral pitch*, which is more or less cohesive, and lastly to *asphalt* and *elastic bitumen*,

which are solid. Bitumen is found in the earth, and burns like pitch, with much smoke and flame. It is a very widely spread mineral, and it now largely employed in various ways. As the binding substance in mastics and cements it is used for making roofs, arches, walls and cellar floors water-tight, and for street and other pavements. It is also used, in some of its forms, for fuel and for illuminating purposes. The bricks of which the walls of Babylon were built are said to have been cemented with bitumen, which gave them unusual solidity. See ASPHALT; COAL, subhead *Bituminous Coal*.

BITUMINOUS SHALE, or **SCHIST**, *shist*, a clay shale impregnated with bitumen and very common in the coal measures. Much of this rock contains so much coal and bitumen that it is used for fuel. See COAL.

BIZET, *be za'*, ALEXANDER CESAR LEOPOLD (1838-1875), a French composer, chiefly known for his light opera, *Carmen*, considered one of the best of its kind. He showed remarkable musical genius at an early age, and while studying in Italy received many prizes for compositions. Returning to France, he adopted the methods of the extreme romantic school, but his work was not warmly received and as a last resort he wrote *Carmen*. This was a failure at first, but it soon won recognition, though Bizet died before its success was assured.

BJORNSON, *byorn'son*, BJORNSTJERNE (1832-1910), a Norwegian novelist, poet and dramatist, whose fame rests chiefly on his stories of Norwegian peasant life. He was educated at the University of Christiania and shortly after leaving the university became known as a contributor of articles and stories to newspapers, and as a dramatic critic. From 1857 to 1859 he was manager of the Bergen theater, and he produced during that time his novels *Synnove Solbakken* and *Arne*, and his first drama, *Between the Battles*. He was editor or associate editor of several periodicals, traveled and lectured in the United States and spent considerable time abroad. In spite of this last fact, however, he was intensely national, and he was the leader of the Norwegians in many popular movements. In 1903 he received the Nobel prize for literature.

Among his tales and novels, besides those mentioned above, are *The Fishermiden*, *A Happy Boy*, *The Bridal March*, *Dust and In*

God's Way; while among his dramas are *The Newly Married Couple*, *Mary Stuart in Scotland*, *A Bankruptcy*, *The King and A Glove*. A popular poem for children, *The Tree*, will be found in the article LANGUAGE AND GRAMMAR, in the section on first-year work.

BLACK, in popular speech the darkest of all colors, but theoretically a hue representing the absence of color (see COLOR). According to the spectrum theory the colors of the rainbow when combined form white; any object which reflects all of these colors is white, and one which absorbs them all is black. In reality a black object is one which reflects the smallest proportion, since total absorption is possible only in theory.

BLACK, WILLIAM (1841-1898), a Scottish novelist, born in Glasgow. His first novel, *Love or Marriage*, was moderately successful, but *In Silk Attire*. *Kilmeny* and, especially, *A Daughter of Heth*, gained him an increasingly wide circle of readers. Among his later works are *The Strange Adventures of a Phaeton*, *A Princess of Thule*, *Green Pastures and Piccadilly*, *Macleod of Dare*, *White Wings*, *Judith Shakespeare*, *Madcap Violet* and *In Far Lochaber*. Black is decidedly at his best when dealing with the Scotch Highlands, where most of his scenes are laid.

BLACK ART. See NECROMANCY.

BLACKBERRY, so called from its luscious black, seedy fruit, is a thorny shrub which grows on well-drained soil in nearly all localities where small fruits thrive. The berries are prized for jams, jellies, wines and preserves, and for dessert. The spring blossoms are pinkish or white; the ripe berry is a collection of numerous purplish black parts arranged around a concealed white center at the end of the stem.

White Blackberries. In 1880 Luther Burbank (which see) began a series of experiments in crossing blackberries. In four years he had sixty hybrids, the first ever produced. From hybrid seeds of the third generation he grew black, red, and yellow raspberries, white, black, red, and pink blackberries, widely varying in sizes, flavors and qualities. One of the most interesting specimens of berries is the white blackberry, a hybrid with abundant clusters of most delicious fruit, perfectly white in color. He found in the eastern states a bramble with an insignificant variety of small, whitish berries; he se-

cured some of these, introduced the type into his blackberry culture, and the result was a combination of the white color with the excellent qualities of the other parent.

BLACK BIRD, a group of North American birds, so called because of the jet black plumage of the males. The females, however, are brownish, commonplace birds. The *red-winged blackbird* is a handsome inhabitant of the marshes, that wears a bright scar-



RED-WINGED BLACKBIRD

let epaulette on each shoulder; it is also called *swamp blackbird*. In the West Central states is another handsome species, whose head and neck are a bright yellow or orange.

In Europe the name is applied to the merle, a well-known thrush which has a rich, mellow and flutelike song. See COWBIRD; CROW BLACKBIRD; GRACKLE.

BLACKBURN, ENGLAND, an important manufacturing city, twenty-one miles northwest of Manchester. It dates from the early modern period; Queen Elizabeth founded a grammar school here in 1557. To-day Blackburn owns its public utilities, but leases them to private companies for operation; has very important manufactures of cotton goods, cotton-weaving machinery and iron products. It was from Blackburn, his native city, that James Hargreaves (which see) was driven when he invented the spinning jenny. The city was incorporated in 1851. Population, 1931, 122,695.

BLACK DEATH, a name given an Oriental plague that in times past has caused the loss of countless lives in the eastern hemisphere. See PLAGUE.

BLACK-EYED SUSAN, a popular wild flower with orange-yellow petals and a con-

spicuous purple-black center. The flower stems and leaves of the plant are rough and hairy, and each stem is topped by a single blossom. Black-eyed Susans are attractive garden flowers and are easily cultivated.

BLACKFISH, or **TAUTOG**, *taw tog'*, a fish caught on the coasts of both Atlantic and Pacific oceans. Its back and sides are of a bluish or crow black; the under parts, especially in the males, are white. It is plump in appearance, and much esteemed for the table, varying in size from two to twelve pounds.

BLACKFOOT, more properly the **SIKSIKA**, a tribe of American Indians, a branch of the great Algonquian family. The origin of the name is in doubt, but it is believed to be derived from the discoloration of their footwear by the ashes of prairie fires. In 1790 they numbered about 9,000 members; today they number in the United States slightly fewer than 4,000, all but about 30 of them on the Blackfoot Agency and Reservation, in Montana; in Canada, on three reservations in Alberta, are about 2,200.

BLACK FOREST, a chain of European mountains in the southwestern part of Germany, in Baden and Württemberg, running almost parallel with the Rhine for about eighty-five miles. The Danube, Neckar, Kinzig and other streams rise in the Black Forest, which is rather a chain of elevated plains than of isolated peaks. The highest summit is Feldberg, 4,900 feet. The principal mineral is iron, and there are numerous mineral springs. The forests are extensive, chiefly of pines and similar species, and yield much timber. The manufacture of wooden clocks, toys and musical instruments is the most important industry, employing about 40,000 persons. The inhabitants of the forest are quaint and simple in their habits, and the whole district preserves its old legendary associations.

BLACK FRIDAY. See GOULD, JAY.

BLACK GUM, an American tree yielding a tough, close-grained wood, used in making wheel hubs. The leaves are handsome and turn a bright crimson in autumn. The fruit is blue black in color, whence it seems to get its name of black, but there is no gum about the tree. It is called sour gum, pepperidge and tupelo, and has been introduced into Europe as an ornamental tree.

BLACK HAWK (1767-1838), a chief of the Sac and Fox tribes of Indians, who was

born in Kaskaskia, Ill. He earned his position as head chief of the allied tribes by his successful expeditions against the Osage and Cherokee tribes. In 1804 the Sacs and Foxes agreed to cede to the United States lands extending about 800 miles along the Mississippi River. This contract Black Hawk repudiated, claiming that the chiefs had been made drunk before they signed the documents. During the War of 1812 Black Hawk, tempted by British agents, joined them with about 500 warriors, but soon retired



BLACK HAWK

from British service. In 1823 most of the Sacs and Foxes, under the leadership of Keokuk, removed to their reservation beyond the Mississippi River; but Black Hawk, with part of the tribe, refused to emigrate and fought with the whites what is known as the Black Hawk War. After several encounters, the Indians were defeated, and Black Hawk and his two sons became captives. The three were confined in Fortress Monroe until 1833, when they were permitted to join their tribe in the reservation near Fort Des Moines. A colossal statue in honor of Black Hawk, designed by Lorado Taft, has been placed on a bluff near Oregon, Ill.

BLACK HILLS, a somewhat mountainous region located in the southwestern part of South Dakota and extending into Wyoming. The altitude varies from 2,500 or 3,000 feet to peaks 7,200 feet high. The Black Hills are known as one of the best mining regions in the United States. The territory was purchased of the Indians in 1876, and mining operations were begun the year following. Gold, silver, copper, lead, iron and a number of valuable building stones are obtained in the region. Gold to the value of over a hundred million dollars has been taken here.

BLACK HOLE OF CALCUTTA, a small room in an old fort in Calcutta, India, memorable as the scene of the death by suffocation of more than 100 English soldiers. On the night of June 20, 1756, 146 defenders of the fort were thrust into the room by their Hindu captors, and forced to remain there during the intensely hot night. The room, which was eighteen feet long and less than

Alfteen feet wide, had only two small windows, and by morning all of the prisoners but twenty-three had died. A vivid description of the place is given in Macaulay's essay on Clive.

BLACK'ING, a dressing for boots and shoes, usually containing for its principal ingredients oil, vinegar, ivory or bone black, sugar or molasses, strong sulphuric acid and sometimes rubber gum and gum-arabic. It is used either as liquid or in the form of paste, the only difference being that in making the paste a portion of the vinegar is withheld and more lamp black or ivory black is added.

BLACKLIST, a printed and secretly distributed list of names of persons considered objectionable from the point of view of the compilers. As used in connection with labor problems the term refers to lists of persons considered undesirable as workmen by either employers or labor unions. Employers often object to prospective employees because of their activity in the cause of unionism, while the unions object to men for exactly opposite reasons, viz., that such persons have refused to join the union or obey its orders, or have lent their assistance as strike breakers. Laws against the use of blacklists have been passed by Congress and by about twenty-five states, but these laws are hard to enforce, because it is easy to conceal the exchange of information on which blacklists are based, and also because employers where union influence is not a dominating factor may discharge workmen without assigning reasons. Less is heard today than formerly about blacklists.

BLACK'MAIL, a certain amount of money, corn, cattle or the like, anciently paid, in the north of England and in Scotland, to certain men who were allied to robbers, for protection by them from pillage. The modern use of the term applies to money extorted from persons under threat of exposure for alleged violation of legal or moral codes.

BLACKMORE, RICHARD DODDRIDGE (1825-1900), an English novelist whose fame rests almost entirely on *Lorna Doone*, a story of Exmoor and the neighboring district. This work, with its stirring plot and beautiful descriptions, is written with a realism which makes it hard for a reader to believe that it is but fiction. The author was born at Longworth, Berkshire, and educated at Tiverton school and Exeter College, Oxford. In 1852

he was called to the bar at the Middle Temple, and he practiced law until his health failed. While living on a fruit farm a short distance from London, he began his literary career by the publication of a volume of poems. Blackmore wrote a number of novels, besides his masterpiece, among which are *The Maid of Sker*, *Alice Lorraine*, *Cripps the Carrier*, *Mary Anerley* and *Kit and Kitty*.

BLACK MOUNTAINS, a ridge of mountains located in North Carolina and the northern part of Georgia and Alabama, and extending approximately east and west. The Black Mountains form the southern spurs of the Appalachian system and contain the highest peaks east of the Rocky Mountains. The most noted of these are Mount Mitchell, 6,710 feet, the highest point east of the Rocky Mountains on the American continent; and Clingman's Peak and Guyot's Peak, both of which exceed 6,500 feet in altitude. See APPALACHIANS; BLUE RIDGE.

BLACK PRINCE THE. See EDWARD, THE BLACK PRINCE.

BLACK SEA, called by the ancients *Pontus Euxinus*, is a great body of water between Europe and Asia, covering 165,000 square miles in area, exclusive of its tributary, the Sea of Azov, an area nearly as large as Ohio, Indiana, Kentucky and Illinois, combined. The sea is connected with the Mediterranean by the Bosphorus, the Sea of Marmora and the Dardanelles. It is 750 miles long, 380 miles wide, and its greatest depth is nearly a mile and a half. Navigation is difficult at times, owing to the violence of storms. Its chief affluents are the Danube, Dniester, and Dnieper rivers.

On the European side are the important cities of Odessa and Batum. The leading city on its Asia Minor shores is Trebizond. For many years Russia maintained complete control of this sea, and it was with reason called a "Russian lake"; vessels of other nations could enter it only with Russia's consent, and the Powers forbade the naval vessels of the czar from leaving it to enter the Mediterranean. After the World War, the Treaty of Lausanne (1923) opened it to the unrestricted commerce of all countries.

BLACKSNAKE, in some sections known as the BLUE RACER, or GREEN RACER, from its under surface, is a common snake in North America, reaching a length of five or six feet, and exceedingly agile and swift. It has no poisonous fangs and therefore is com-

paratively harmless, though it possesses the power of destroying very small prey by the contraction of its folds. Its power of contraction, however, is not sufficient to injure even a child. There was once a belief that it was an arch enemy of rattlesnakes and that it pursued and destroyed them. This is untrue.

The blacksnake is one of the most numerous of America's snakes; it lives on the ground, but is able to climb trees and to cross streams. It eats frogs, toads, birds and their eggs, mice, and the like. During the winter a number of these snakes will coil themselves into a ball for their long hibernation. The female lays from fifteen to twenty eggs in any secure place, and they hatch by the heat of the sun. If one desires such repulsive pets, the blacksnake, taken young, can in most instances be tamed.

BLACKSTONE, SIR WILLIAM (1723-1780), probably the most notable lawyer of modern times, famous for his *Commentaries*, which every law student, even to-day, must read. He was admitted to the bar in 1746, but soon gave up the law and established a course of lectures at Oxford on the law and constitution of England. His lectures attracted much attention, and he was soon after appointed to the chair for the study of the common law of the country. After resigning his professorship, he published his lectures as *Commentaries on the Laws of England*. The merits of this book made it for a long time the principal text-book of English law, and all subsequent American and British commentaries have been based on it.

BLACKWELL, ELIZABETH (1821-1910), the first woman who ever obtained a medical diploma in the United States. She was born in England and in 1831 settled with her parents in America, where she was engaged in teaching for several years. After numerous difficulties she was admitted to the College of Geneva, N. Y., and was graduated in medicine in 1849. She afterward studied in Paris, and on her return to America commenced practice in New York, where she afterwards chiefly resided. In 1854, with her sister Emily, she opened a hospital for women and children in New York.

BLACKWELL'S ISLAND, a narrow island in the East River, a part of New York City. It is between Manhattan Island and Long Island and measures about one and one-half miles long and one-eighth of a mile wide.

On this island (now called Welfare Island) are the city penal institutions and hospitals.

BLAD'DER. See KIDNEYS.

BLAD'DERWORT, the common name of curious, slender, aquatic plants, species of which are natives of Great Britain and the United States. They grow in ditches and pools, and they are named from having little bladders or vesicles that fill with air at the time of flowering and raise the plant in the water, so that the blossoms expand above the surface. The bladders have small openings in which insects are sometimes caught, and if the ditch or pool dries up, the vesicles hold moisture and keep the plant alive for some time.

BLAGOVESH'CHENSK, a city of Far Eastern Soviet Russia, on the Amur River near its union with the Zeya, and on a branch of the Siberian Railroad. It is an administrative center and a trading station for tea, cattle, grains and gold. Population in 1933, 63,500.

BLAINE, JAMES GILLESPIE (1830-1893), one of the great statesmen of America, whose last years were filled with bitter regret that he had been denied the Presidency, the goal of his ambition. He was born near Pittsburgh, Pa., and was educated at Washington College, from which he graduated when only seventeen years of age. He taught school and studied law for several years, was married in 1851 and three years later went to Augusta, Maine, where he began editorial work on the *Kennebec Journal*, a weekly newspaper. He soon was offered a more influential position on the *Portland Daily Advertiser*. He joined the Republican party at its formation, early became its leader and practical dictator in Maine, was elected to the state legislature, where he served until 1862, and in 1863 took his seat in the House of Representatives. He was made Speaker of the House in 1869, which position he held until 1875. While in Congress he made a number of important speeches on financial questions and participated in many celebrated debates, becoming known as a national leader of his party. He was later sent to the Senate, where he remained five years.

In 1875 he was accused of corrupt practices in securing legislation in favor of certain railroad projects in which he was interested. The charge was agitated by his political opponents and, together with certain parts of his record in Congress, made so many

enemies that he lost the popularity that might have led to the Presidency. He was unsuccessful in his candidature in 1876 and again in 1880, but became Secretary of State under Garfield. After the death of Garfield, Blaine resigned and began his *Twenty Years in Congress*, a voluminous and valuable work. In 1884 he was nominated for president, but was defeated by Cleveland. When Harrison was elected President, Blaine was made Secretary of State for the second time and fulfilled the duties of the office with distinction, dealing with several trying foreign questions with the utmost tact and ability. He was for years the leading exponent of the doctrine of reciprocity in commercial relations. He resigned from Harrison's Cabinet and became a candidate for the nomination for President in 1892, but was defeated in the convention.

BLAIR, the family name of three men, father and two sons, distinguished in American history.

Francis Preston Blair (1791-1876), was born in Virginia. He edited the Washington (D. C.) *Globe*, an organ of the Jackson Democrats, from 1829 to 1845, became one of the organizers of the Republican party in 1856 and was presiding officer of the convention which nominated John C. Fremont for President. Four years later he was a leading member in the Chicago convention which nominated Lincoln. He became a Democrat again in 1865, because opposed to the government's reconstruction policy.

Montgomery Blair (1813-1883), son of the above, was born in Kentucky, was graduated at West Point and served in the Seminole War. In Maryland, to which state he moved, he practiced law, and was counsel for Dred Scott in that celebrated case. With his father he joined the Republican party, and became Postmaster-General in Lincoln's first Cabinet. He was instrumental in introducing money orders, free mail delivery and the sorting of mail on trains.

Francis Preston Blair, Jr. (1821-1875), was born in Kentucky, served in the Mexican War, then edited a Missouri paper until 1856. As a Republican he served three terms in Congress. Volunteering in the Civil War, he rose to the rank of major-general in 1862. After the war, like his father, he became a Democrat again, and was the nominee for Vice-President on the ticket with Horatio Seymour. From 1870 to 1873 he filled a vacancy in the United States Senate.

BLAKE, EDWARD (1833-1912), a Canadian statesman, born and educated in the province of Ontario. Following a successful law practice, in 1867 he became leader of the Liberal Opposition in the Ontario assembly, and in 1871 was elected Premier of the province. Blake was elected to the Dominion Parliament in 1867 and was Minister of Justice in 1875-1877, taking a leading part in organizing the Supreme Court of Canada. He sat in the Dominion House of Commons almost continuously until 1891. From 1892 until 1907, he represented the Irish Nationalists in the British House of Commons.

BLAKE, ROBERT (1599-1657), a British admiral who first rose to fame during the civil war between Charles I and Parliament. After winning several land battles for the rebels, in 1649 he was made general of the sea, and in 1650 he defeated the royalist squadron under Prince Rupert off Malaga, Spain. In 1652 he became sole admiral. Blake further distinguished himself in the naval war with Holland, defeating Admiral Tromp in a series of sea battles fought in 1652-1653. In 1654 his fleet was victorious in the Mediterranean in contests with the Dutch, the Spanish and the French. He punished the dey of Tunis for an insult to the British flag, set free the English slaves at Algiers and at Tripoli, and in 1657 defeated the Spaniards at Santa Cruz.

BLAKE, WILLIAM (1757-1827), an English poet and artist, born in London of Irish parentage. From an early age he was under the influence of his father, a disciple of Swedenborg, and the boy grew up in an atmosphere of mysticism. He did not attend school, but studied drawing and then spent several years as a graver's apprentice, becoming an independent engraver at the age of twenty. In later years he devoted himself to creating designs for copper plates used in illustrating his own and other poems, including Dante's *Divine Comedy* and *The Book of Job*. Among these illustrations are water-color paintings of the highest artistic quality. Blake's best literary work is included under the titles *Songs of Innocence* and *Songs of Experience*. Like his art work, these poems are distinguished for their mystic tone and richness of imagination.

BLANC, MONT. See MONT BLANC; SWITZERLAND.

BLANC-MANGE, *blah mahNzh'* in cookery, the name of different preparations of the

consistency of a jelly, variously composed of dissolved isinglass, arrowroot, maize-flour and other substances, with milk and flavoring. Chocolate and fruit juices are frequently added, and the dish is a popular dessert.

BLAND, RICHARD PARKS (1835-1899), an American statesman, the leading advocate of bimetallism (which see) of his generation was born near Hartford, Ky. He practiced law in Missouri, California and Nevada, where he was also interested in mining. He was a member of Congress from Missouri from 1874 to 1895 and from 1897 to his death, gaining special prominence as an advocate of the free coinage of silver and as author of the Bland-Allison silver bill of 1878. He was a candidate for the Democratic nomination for President in 1896, but was defeated by William J. Bryan.

BLANK VERSE, verse without rhyme, first introduced into English poetry by the Earl of Surrey, in the first half of the sixteenth century. The most common form of English blank verse, that which is used in the dramas of Shakespeare, is the line of five iambic feet. There is often an extra syllable in a line, and sometimes the accent is on the first syllable of the foot. From Shakespeare's time blank verse has been almost universally employed by poet dramatists, although Dryden wrote his dramas in rhyme. The first use of the term blank verse is said to be in *Hamlet*, II, 2: "The lady shall say her mind freely, or the blank verse shall halt for't." The term is not applied to the Anglo-Saxon and early English alliterative unrhymed verse.

Bryant's *Thanatopsis* and Longfellow's *Erangeline* are written in blank verse. The first stanza of the latter is given as an excellent example:

This is the forest primeval. The murmuring
pines and the hemlocks,
Bearded with moss, and in garments green,
Indistinct in the twilight,
Stand like Druids of eld, with voices sad and
prophetic,
Stand like harpers hoar, with beards that
rest on their bosoms.
Loud from its rocky caverns, the deep-voiced
neighboring ocean
Speaks, and in accents disconsolate answers
the wail of the forest.

BLARNEY STONE, a famous stone near the top of Blarney Castle, Ireland, which is four miles from the city of Cork. According to an old story, the first owner of the castle delayed its surrender by flattering speeches, and from this legend has come the custom of

kissing the Blarney Stone, a practice that is said to give one the power of saying flattering things, or "blarneying."

BLASH'FIELD, EDWIN HOWLAND (1848-1936), an American artist, one of the foremost decorative painters of his time. He was born in New York City. Blashfield began his career as a figure painter, after several years of European travel and study, but after 1892 he devoted his time to the decoration of important buildings. He painted the central dome of the Library of Congress; made two great paintings for the Baltimore courthouse—*Washington Resigning his Commission* and *Lord Baltimore's Edict of Toleration*; and painted on the ceiling of the ballroom of the Waldorf-Astoria Hotel a picture representing *Dance and Music*. These are representative of his best work, which is greatly admired for beauty and delicacy of coloring. Blashfield and his wife were co-authors of *Italian Cities* and co-editors of Vasari's *Lives of the Painters*.

BLAST FURNACE, the name given to the common smelting-furnace, used for obtaining iron from its ores with the aid of a powerful blast of air. The process of smelting is described in the article STEEL.

BLASTING, the operation of breaking up masses of rock or other hard substances, by means of explosives, usually dynamite. In ordinary operations holes from 1 to 6 inches in diameter are bored into the rock by means of a steel-pointed drill. After the hole is bored to the requisite depth, it is cleaned out, the explosive is introduced, the hole is *tamped* or filled up with broken stone, clay or sand, and the charge is exploded by means of a fuse or by electricity. In larger operations, mines or shafts of considerable diameter take the place of the holes above described, and the excavations are made by machinery. Shafts are sunk from the top of the rock to various depths, sometimes upward of 60 feet. This shaft joins a heading, or gallery, driven in from the face, if possible, along a natural joint; and from this point other galleries are driven some distance in various directions, with headings at intervals, returning toward the face of the rock and terminating in chambers for the charges. Enormous charges are frequently made use of, upward of twenty tons of gunpowder having been fired in a single blast.

One of the greatest blasting operations was the removal of the reefs in the

East River, near New York, known as Hell Gate. An entrance shaft was sunk on the Long Island shore, from which the reef projected. From this shaft nearly twenty tunnels were bored in all directions, extending from 200 to 240 feet, and connected by lateral galleries. Upward of 142 tons of dynamite, rackarock and powder were used, and millions of tons of rock were dislodged.

The most notable blasting operation of the present century was at Culebra Cut (now Gaillard Cut) on the Panama Canal, in October, 1913. The Gamboa dyke was blown up, to join the waters of the two oceans. Forty tons of dynamite were placed in 1,000 holes, and President Wilson, at the end of a special wire in Washington, ignited the charge. See DYNAMITE; GUNPOWDER.

BLAVATSKY, *bla vahts'ke*, HELENA PETROVNA HAHN-HAHN (1831-1891), a Russian theosophist, born in Ekaterinoslav. She traveled extensively and gained considerable reputation through her dealings with occult science and spiritism. She became thoroughly familiar with the Buddhist philosophy and other doctrines of the East and established in Bombay the *Theosophist*. Later investigations proved her pretended miracles impostures, but though she lost prestige, she had about 100,000 followers in Europe and America when she died. She was a voluminous writer. The most important of her works is *Isis Unveiled*, which is the text-book of her followers.

BLEACHING, the art of freeing textile fibers and fabrics from their natural color and rendering them white. The ancients bleached fabrics by exposing them to the action of the sun and frequently wetting them. This method was employed by the Egyptians, Babylonians and other peoples of antiquity. Modern bleaching seems to have originated with the Dutch, and for a long time they held a monopoly of the business for Europe. Their method was similar to that employed by the ancients and usually required an entire season for bleaching linen. The cloth was repeatedly steeped in lye, soaked in buttermilk, washed and spread upon the grass to whiten. Because of the great skill attained by these people, the name *hollands* was applied to the best grades of linen and is still retained; because of the method of bleaching the finest fabrics, by spreading them on the best plots of grass land, such fabrics were called *lawns*.

The Dutch method of bleaching has now been displaced by what is known as the *chlorine* process. This consists of cleaning the cloth, then boiling it for about twelve hours in a solution of water and slaked lime, to which a small quantity of caustic soda is added. After the boiling the cloth is washed, then passed through a pure solution of hydrochloric acid, washed again and then soaked for from two to four hours in a bleaching solution. This is prepared by dissolving bleaching powder (chloride of lime) in water, and adding a quantity of this to the bath. When taken from the bleaching solution, the cloth is again washed, then placed in a weak solution of sulphuric acid, which completes the process. After bleaching, the cloth is passed through a wash containing bluing; it is then starched, dried, calendered and packed for the market. In large bleaching houses the work is all done by machinery. Details of the process vary.

BLEEDING. See HEMORRHAGE.

BLEEDING HEART, a showy garden plant, so called because of its drooping, deep red flowers, which are irregularly heart-shaped. The branching stem grows to be from one to two feet high, and the three-lobed leaves somewhat resemble those of the peony. The bleeding heart is a spring-blooming perennial, native to Japan and China, and first introduced into Europe in 1846. It responds easily to cultivation, and the drooping sprays of rose-colored flowers make a striking decoration for garden borders.

BLLENDE, *blend*, an ore of zinc, a mineral composed of zinc and sulphur and constituting the ore from which most of the zinc of commerce is obtained. When pure, it contains about sixty-six per cent of that metal. It occurs in both massive and crystallized forms, and in color it is yellow, brown or black. In the United States, deposits of blende occur in Illinois, Iowa, Missouri and Wisconsin. The most valuable European deposits are in Cornwall, England, in Saxony and in the Hartz Mountains. See ZINC.

BLENHEIM, *blen'im*, a village in Bavaria on the Danube, twenty-three miles north of Augsburg. Near it was fought in 1704, during the War of the Spanish Succession, the famous Battle of Blenheim, in which the allied forces of England and Germany, under the duke of Marlborough and Prince Eugene, gained a victory over the French and Bavarians.

BLANNERHASSETT, *blen er has'et*, HARMAN (1764-1831), a wealthy English-American, chiefly noted for his connection with the plot of Aaron Burr to found an independent empire in the Southwest. He was born at Hampshire, England, educated at London and at Trinity College, Dublin, but came to the United States in 1797 and settled on an island in the Ohio River below Parkersburg. Here, in 1805, he entertained Aaron Burr, who induced him to join in his conspiracy. When the scheme fell through, Blennerhassett was tried for treason, and though he was finally discharged, he lost his property. See BURR, AARON.

BLES'BOK, an antelope of South Africa, with a white marked face, a general purplish-chocolate body and a saddle of a bluish color. It was formerly found in great numbers in the Transvaal and Orange Free State, but hunters have reduced the number of blesboks materially.

BLIGHT, *blite*, a generic name commonly applied to denote the effects of disease upon plants, or any other circumstance which causes them to wither or decay. It has been vaguely applied to almost every disease of plants from any cause whatever. The term is frequently limited, however, to disease in cereal crops, and botanists confine it to diseases originating from bacteria or parasitic fungi. See RUSTS; SMUTS.

BLINDFISH, the descriptive name given to small, sightless fishes inhabiting the water in great caves. The Mammoth Cave of Kentucky contains characteristic specimens. The eyes are reduced to a rudimentary condition, which indicates that the remote ancestors of these fishes could see. Their bodies are translucent and colorless. The head and body are covered with small "feelers" which serve as organs of touch.

BLINDNESS, the lack of, or the deficiency in, the sense of sight. Blindness may vary in degree from the slightest impairment of vision to total loss of sight; it may also be temporary or permanent. It is caused by defect, disease or injury of the eye, of the optic nerve or of that part of the brain connected with it. Old age is sometimes accompanied by blindness, occasioned by the drying up of the humors of the eye, or by the opacity of the cornea or the crystalline lens. There are several causes which produce blindness from birth. Sometimes the eyelids adhere to each other, or to the eyeball itself; often a

membrane covers the eyes; sometimes the pupil of the eye is closed, or adheres to the cornea, or is not situated in the right place, so that the rays of light do not fall in the middle of the eye.

Of the eye diseases common in infancy, the most serious is *ophthalmia neonatorum*, infection of the membrane that covers the lids and eyeballs. It usually appears on the second or third day after birth, and if not promptly checked causes permanent blindness. Typical symptoms are swollen lids and the discharge of matter. If the eyes of a new-born baby show the slightest signs of inflammation, they should be treated at once. A few drops of silver nitrate solution will prevent the infection from developing. One-third of the blindness in children is caused by this terrible disease.

Education of the Blind. The first book calling attention to the duty of educating the blind was published in Italy in 1616. While various attempts had been made to relieve the sufferings of these unfortunate persons, it was not until the latter part of the eighteenth century that any attempt was made to give them systematic instruction. The first school for this purpose was founded by Valentin Haüy in Paris in 1784. A similar school was established in England in 1791, and the success of these institutions was such that within the next twenty years schools for the blind were established in all of the leading countries of Europe. The first school in the United States was established in Massachusetts in 1829, as the New England Asylum for the Blind. From the start this school received aid from the state, and the other New England states availed themselves of the advantages it offered by sending, at state expense, their blind to this institution. The name New England Asylum was later changed to Perkins Institute and Massachusetts Asylum for the Blind, and the school, under the direction of Dr. Samuel G. Howe, became the leading institution of its kind in the country. Soon after its founding, the Perkins Institute gave exhibitions by its pupils before the legislatures of a number of different states, and the influence of this work was such as to secure the establishment of like institutions in many parts of America. The work has spread until now nearly every state maintains institutions for the education of the blind in its school system.

The education given is along three lines:

literary, including the branches taught in most high and secondary schools, with the exception that less attention is given to foreign languages; *musical*, including instruction on the piano, organ and other instruments, musical composition and the training of the pupils for giving lessons upon the different instruments; *industrial*, training in those occupations in which the blind can successfully engage, such as broom-making, basket-making, mattress-making, and sewing, knitting, crocheting, carpet-weaving and piano-tuning. In these lines many of the students become experts. For a long time the pianos in the public schools of Boston have been kept in tune by members of the Perkins Institute.

Since the blind obtain the greater part of their knowledge through the sense of touch, special books and apparatus are necessary for giving them a literary education. The first attempts at teaching the blind to read were by the use of raised letters, which in form were similar to the ordinary letters of the alphabet. They learned the forms of the letters by running the fingers over them, and in this way learned to read. Another system, known as the *point* system, is now in very general use. By this, different numbers of dots indicate the different letters of the alphabet. The advantage of this system over the other is that it enables the blind to write as well as read. The point is written by means of an apparatus consisting of a board with a grooved surface, over which a frame is fitted. The paper is placed on a board, the frame is laid upon it, and the points are made by the use of a stiletto, which is used with an abbreviated metal rule. The writing is from right to left, since the paper is reversed for reading. The point system in widest use is the

the alphabet system are in use. The advantage of the alphabet system is that it enables blind children to learn to read either at home or in the public schools, before they are old enough to enter an institute. Geography is taught by the use of relief maps, in which the towns are indicated by metallic points, the boundaries by raised lines, and the mountains, valleys and rivers in the ordinary manner of relief maps. Natural history is taught by the use of life-size models and mounted specimens of animals and birds, while botany is taught in a similar manner, only the models are larger than the plants which they represent, in order that the parts may be ascertained by touch.

BLIND WORM, a small brown or silvery-gray reptile common in Southern California. It is similar to but of less size than the glass-snake (which see). The blindworm is so called because of its small eyes and their covering of transparent skin.

BLISS, PHILIP PAUL (1838-1876), an American evangelist, born at Clearfield, Pa. In company with the evangelist Dwight L. Moody, he held mission services in all parts of the United States, leading in the singing of hymns of his own composition. *Hold the Fort*, *Pull for the Shore*, and *Hallelujah, 'Tis Done* are the best known of these. He and his wife were killed in a railroad wreck at Ashtabula, Ohio.

BLISS, TASKER HOWARD (1853-1930), an American soldier, born at Lewisburg, Pa., and a graduate of West Point in 1875. After a period of teaching at the Naval War College and two years of service as attaché of the American legation at Madrid, he entered upon duty in the Spanish-American War. After peace was declared he was collector of customs at Havana, then was a

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LETTERS OF THE BRAILLE SYSTEM

Braille. It takes as its basis six points or dots. These are arranged in two vertical parallel columns, and are shifted into different combinations to indicate different letters.

In all of the best schools both the point and

special envoy to Cuba to negotiate a reciprocity treaty between that country and the United States. In 1903 he was commandant of the War College; from 1905 to 1909 he served in the Philippines; in 1911 was transferred to service on the Mexican border, and

in 1912 became commander of the Department of the East.

Early in 1915 Bliss became assistant chief of staff of the army, and in November of the same year he was raised to the grade of major-general. He was appointed acting chief of staff after the departure of General Hugh L. Scott to Russia, as a member of the Root mission, and in September, 1917, on Scott's retirement, he was made chief of staff. He reached the age of retirement on December 31, 1917, but was reappointed immediately, and raised to the full rank of general. General Bliss served on the inter-allied war council in France, and was one of the official American delegates to the Peace Conference which began sessions in January, 1919.

BLIS'TER, an application which, when employed on the skin, raises the cuticle in the form of a sac, which fills with serous fluid. The Spanish fly blister operates most certainly and most quickly and is commonly used; but mustard, croton oil, ammonia and other substances are also used. Blisters are employed in the treatment of pleurisy, muscular pains and joint disorders.

BLIZ'ZARD, the name given to a severe storm accompanied by a strong, cold wind and fine, dry snow or spicules of ice. The term applies particularly to storms of this character which are common during the winter in the northern part of the Mississippi basin, especially in the border states and Canada, though they may extend as far south as the Ohio River. The blizzard is usually preceded by a short period of warm weather and comes without apparent forewarning, often causing loss of life among people who are far from home. During the storm the condition of the atmosphere is such as to make it exhausting both to men and animals, while the air is so completely filled with fine snow that it is impossible to see objects at a distance of more than a few feet. The Weather Bureau is now usually able to forecast the approach of these storms, so as to warn the inhabitants in time to enable them to find shelter before the storm breaks.

BLOCKADE', the closing of the ports of an enemy in time of war by naval or military forces of its opponent. Notice of contemplated blockade must be sent in advance to all neutral nations; if any vessel in defiance of a blockade attempts to trade with blockaded cities it does so at the risk of confisca-

tion of ship and cargo. The crews of vessels caught cannot be punished.

In order that a blockade shall be recognized as such the blockading nation must have naval and military forces at hand in sufficient numbers to enforce its decree. If a blockade is decreed and there is insufficient force to patrol the shut-off coasts, such a decree is called a *paper blockade*—on paper only. Even in such case, however, any vessel caught in the attempt to pass through a loose blockade is subject to the same penalties, if caught, as would follow in case the patrol were more effective.

According to accepted rules of war blockades are legal, for it is the right of each belligerent (which see) to use all means in its power to weaken and distress the enemy. Not only is it proper to prevent arms and munitions of war from reaching an enemy, but it is just as important to keep out raw materials which enter into the manufacture of anything employed in war. This extends even to foodstuffs, notwithstanding the fact that an effective blockade may reduce non-combatants to the verge of starvation.

In the World War Germany thought its navy could prevent a blockade of its coasts by Great Britain and France. When it failed to do so it declared their blockade illegal, but very soon announced on its part a blockade of England's coasts, outlawing any vessel which approached nearer than a hundred miles on the Atlantic side. This was called a *paper blockade* by neutrals, because, even with the aid of its submarine fleet, it could not enforce its decree.

For an account of Napoleon's effort to conquer England by a blockade, see *Continental System*.

BLOCK AND TACKLE,

a mechanical contrivance consisting of one or more grooved pulleys, mounted in a casing or shell, which is furnished with a hook, eye or strap by which it may be attached to an object, the function of the apparatus being to transmit power or change the direction of motion by means of a rope or chain passing round the movable pulleys. Blocks are single, double, treble or four-fold, according as the number of sheaves or pulleys is one, two, three or four. A *movable block* is attached to the ob-



BLOCK AND TACKLE

ject to be raised or moved; a *fixed block* is attached to some permanent support. Blocks also receive different names from their shape, purpose and mode of application. They are made of either iron or wood. By the use of blocks heavy weights can be raised with comparatively little power.

BLOCKHOUSE. In early times, and in localities where danger from enemies was always present, houses were built of heavy logs or blocks of hewn timber and were fitted with loopholes for musketry. When of more than one story, the upper stories were made to overhang those below, and in the overhanging **floors** loopholes were cut so that the defenders might fire down upon an enemy who undertook to break into the house or burn it. Such block-houses were in general use among the American colonists in their



BLOCKHOUSE

wars with the Indians, and saved many lives.

The nearest approach to modern block-houses is the system of steel forts erected by France along the Franco-German border. These are almost entirely underground; the steel tops, rounded and equipped with artillery, are visible above ground.

BLOEMFONTEIN, *bloom'fon tine*, the capital of the province of the Orange Free State in South Africa. It is ninety-five miles nearly east of Kimberley, and is at an altitude of 4,518 feet above the sea. The city is a railway junction on the Cape-to-Cairo Railway. It has a college and a theological school. Population, 1931, 54,000 (white portion, 28,500).

BLONDEL, *bloN del'*, a French minstrel and poet of the twelfth century, the confidential servant and instructor in music of Richard, the Lion-hearted. While his master was the prisoner of the Duke of Austria, Blondel, according to the story, went through all parts of Germany in search of him. He sang the king's own favorite lays before each keep and fortress, till the song was at length taken up and answered from the windows of the castle of Durrenstein, where Richard was imprisoned. Sir Walter Scott alludes to Blondel in *The Talisman*.

BLOOD, *blad*, the fluid which circulates through the arteries and veins of the human body and is essential to the preservation of life and the nutrition of the tissues. The fluid content of the blood, a substance called plasma, is about ninety per cent water. Floating in the plasma are millions of tiny corpuscles, of which there are two kinds, red and white. As the former are by far the more numerous they determine the color of the blood. The proportion of white to red corpuscles is about one to 833. The latter are round, with edges thicker than their centers, and are $\frac{1}{82100}$ of an inch across. Red corpuscles contain haemoglobin, a substance which has the property of absorbing oxygen from the air. When charged with oxygen haemoglobin is bright red; when deprived of oxygen it turns darker.

White corpuscles are ball-shaped and larger than the red corpuscles. They have the power to destroy harmful bacteria, and so help protect the body from disease. Still another substance is found in the blood. It is a ferment called fibrinogen, and its function is to manufacture threads in blood exposed to the air on the surface of a wound. It is this process which causes blood to clot and so check the flow from a wound. In the body of an average adult male there are about six quarts of blood, or from twelve to fifteen pounds, about one-thirteenth his weight. For the manner in which the blood circulates through the body see **CIRCULATION**, with accompanying colored illustration.

Blood Pressure. In normal health the blood flows through the blood vessels with little friction, for they have sufficient elasticity to stretch with every beat of the heart. As one grows older, however, the walls of the tubes thicken and became less elastic, and as a result the blood in the vessels is under excessive pressure. High blood pressure is therefore an indication that one is aging or that the circulatory process is not normal. The general cause is wear and tear, which may result in younger people from over-eating, indulgence in alcoholic liquors, over-working, worry, constipation, etc. The normal blood pressure of a person of twenty-three is from 105 to 110. A person of forty cannot safely have a pressure above 140. A prominent life insurance company states that the average pressures of a group of persons accepted were as follows: pressure of those under forty, 125; from forty to

forty-four, 128; forty-five to forty-nine, 130; fifty to fifty-four, 132; fifty-five to sixty, 134.

Related Articles. Consult the following titles for additional information:

Arteries	Haemoglobin	Hemorrhage
Capillaries	Heart	Veins

BLOOD, AVENGER OF, the name applied to one who executes vengeance on the slayer of a kinsman. In primitive society, when a man was killed or seriously injured, the punishment of the person committing the crime devolved, by the so-called right of blood feud, upon the next of kin of the injured person. As society advanced, there was gradually developed the right of sanctuary, and places of refuge were provided where a manslayer might be safe for a time from the avenger of blood. Still later, it was provided that the criminal might gain exemption by paying a fine, which the avenger was compelled to accept. The feuds of the Kentucky mountaineers are a survival of the old custom.

BLOODHOUND, a variety of dog with long, smooth, hanging ears and wrinkled face, remarkable above all other dogs for the acuteness of its smell. It takes its name from its habit of following the trail of wounded prey by the scent of the blood. Among the several varieties of this animal are the English, the Cuban and the African bloodhound, most of which are tawny in color, with black noses. In former times bloodhounds were not only trained to the pursuit of game, but also to the chase of man. They are now principally employed for tracking criminals and escaped convicts.

BLOOD-MONEY, the compensation paid by a manslayer to the next of kin of the person slain, securing the offender and his relatives against vengeance. It was once common in Scandinavian and Teutonic countries, and is still heard of among the Arabs. Certain crimes, such as killing a sleeping person, were regarded as too heinous to be atoned for by a money payment, and the criminal was turned over to the vengeance of the relatives of the man slain.

BLOOD-ROOT, a plant of Canada and the United States, belonging to the poppy order, so named because its rootstock yields a sap of a deep orange color. The leaves are heart-shaped and deeply lobed, and come from the ground singly, folded around the flower stalk, which bears one white or rose-tinted blossom. The plant has been employed as an astringent.

BLOODY ASSIZES, the term of court held by the English Judge Jeffreys in 1685, after the suppression of Monmouth's rebellion. About 300 persons were executed after short trials; very many were whipped, imprisoned and fined, and nearly 1,000 were sent as slaves to the American plantations.

BLOOMER COSTUME, a style of dress for women, consisting of a jacket with coat sleeves, a pair of full, loose trousers gathered into bands at the ankles, and a skirt reaching a little below the knees. This style originated in 1849 in America and was adopted by Mrs. Bloomer of New York, whence the name. A modification of this costume gained temporary popularity among woman bicyclists and golf players, and it is a permanent garment in the gymnasium.

BLOOMFIELD - ZEISLER, *bloom'feeld zise'lur*, FANNY (1866-1927), an American pianist, born in Austrian Silesia. Her parents removed to Chicago, Ill., in 1868 and there provided liberally for their daughter's musical education. When she was eleven years old, her playing attracted the attention of eminent foreign musicians, and in the following year she began to study with Leschetizky. Before she was twenty years old she had played with success in most of the European musical centers, and after her return to America she won recognition as one of the foremost pianists of the time.

BLOOMINGTON, ILL., founded in 1824, is the county seat of McLean County, on the Illinois Central, Chicago & Alton, Big Four, Nickel Plate, and a branch of the Baltimore & Ohio railroads, 126 miles southwest of Chicago. The city has unusual educational facilities, for in addition to the public schools there is the Illinois State Normal University (in Normal, adjoining Bloomington), Illinois Wesleyan University (Methodist), a conservatory of music, a college of oratory and a business college. The manufacturing interests are extensive and varied. The city has repair shops of the Chicago & Alton Railroad. The commission form of government was adopted in 1915, but later abandoned in favor of the council form. Population, 1930, 30,930.

BLOOMINGTON, IND., the county seat of Monroe County, sixty miles southwest of Indianapolis, on the Chicago, Indianapolis & Louisville (the Monon Route), and the Illinois Central railroads. The city is the seat of the Indiana State University, whose build-

ings represent an expenditure of \$1,500,000; it has a Federal building, erected at a cost of \$70,000. There are vast limestone quarries, furniture, leather and hardware factories. There are two parks and one hospital. The first settlement was made about 1818. Population, 1930, 18,227.

BLOWFLY, a large blue and black fly, that lays its eggs upon meat or dead animals.



BLOWFLY

These eggs are called *fly blows*, and hatch very quickly into maggots, which destroy the meat. In the home the blowfly is a pest and a carrier of disease germs. It should be warred upon as vigorously as is the ordinary house fly.

BLOWING MACHINE, a device for supplying a continuous current of air under pressure. Blowing machines are used in connection with smelting furnaces for iron, in blowing glass and for ventilating mines and large buildings. The blowing machine now generally used is the fan or fan blast machine. In its most common form the fan consists of four spokes of a rimless wheel, tipped with vanes and made to rotate in a cylindrical chest, in which it has often a slightly eccentric position. There are openings on both sides round the spindle for admission of air, which, sucked in by the centrifugal action of the fan as it quickly rotates, flows toward the vanes, and is driven through an exit pipe attached to another part of the cylinder.

A new form of blower has a chamber in which three drums of equal size are enclosed, two in a line below and one above; the upper one is provided with wings, and the two lower have wide slots along their entire length, allowing the wings to enter in the course of rotation. The function of the two lower drums is to supply alternately abutments to prevent the escape of the air. They

are caused to revolve in proper relation with the motion of the upper drum by spur-wheels on the journals, which mesh into another spur-wheel on the shaft of the upper drum.

BLOWPIPE, an apparatus for driving a current of air through the flame of a lamp, candle or gas jet, and directing it upon any substance desired. In its simplest form the blowpipe is merely a conical tube of brass or glass, usually seven inches long and one-half inch in diameter at the larger end and tapering so as to have a very small aperture at the smaller end. Within about two inches of the smaller end the pipe is bent nearly to a right angle, so that the stream of air may be directed sidewise to the operator. The flame, if turned to a horizontal direction, takes a conical shape and consists of two different parts, each recognized by its peculiar color. The greatest heat is obtained at the tip of the inner or blue flame, if the substance subjected to it is burned or oxidized.

For instance, a small piece of lead or copper placed at this point is soon changed to lead or copper oxide, and hence the name of this flame is the *oxidizing* flame. By moving the substance to the interior blue flame, which contains no oxygen, the oxide will be removed and the pure metal will be left. For this reason this has been called the *reducing* flame. Many minerals can be either oxidized or reduced at pleasure, and the blowpipe forms a ready test in the hands of the mineralogist. The current of air is often produced by bellows instead of the breath, this instrument being fixed in a frame for the purpose.

BLUBBER, the fat of whales and other large sea animals, from which train oil is obtained. The blubber lies under the skin and over the muscles. It is eaten by the Eskimo and the seacoast races of the Japanese islands. Refined blubber is the source of oils used in soapmaking and as lubricants and fuel. The whole quantity yielded by one whale ordinarily amounts to from two to four tons.

BLUCHER, *blük'ur*, GEBHARD LEBRECHT VON, Prince of Wahlstadt (1742-1819), a Prussian general, distinguished for the part he played in the Battle of Waterloo. When seventy years old he was appointed commander in chief of the Prussians in the struggle against Napoleon, and his heroism was shown in the battles of Lützen and Bautzen. He led the Prussian army which invaded

France early in 1814, entered Paris, and on the renewal of the war in 1815, when the chief command was again committed to him, he led his army into the Netherlands. Napoleon at once attacked him, and Blücher, on June 16, was defeated at Ligny. In the Battle of Waterloo Blücher arrived at the decisive moment and assisted materially in completing the great victory of the allies. See WATERLOO, BATTLE OF.

BLUE, one of the three primary colors, seen in nature in the clear sky and the sea. The various shades of blue are most brilliantly displayed in the sapphire and the turquoise. In the arts blue is used as a dye and is derived from products of the vegetable, animal and mineral kingdoms. Indigo is the most common vegetable material for producing it. The principal blues used in painting are ultramarine, Prussian or Berlin, Bremen and cobalt. In the three-color process of printing, blue is used with yellow and red, the other primary colors.

BLUEBEARD, the chief character in a legend that has been told since the seventeenth century. Bluebeard, so called because his beard was of a bluish shade, was a monster of cruelty. When about to depart on a journey he gave to his wife Fatima the keys of his castle, warning her that the door of a certain room should not be unlocked. Unable to conquer her curiosity, Fatima opened the door and found in the forbidden room the bodies of six women, her predecessors, whom Bluebeard had killed in succession. When the bloodthirsty husband returned home he discovered Fatima's disobedience by blood on the key, and would have made her a seventh victim had her brothers not arrived in time to save her by killing him. Though Bluebeard is a fictitious character, it is believed that the legend is founded on the wicked acts of a certain Gilles de Laval, who lived in the fifteenth century.

BLUEBELL, a name applied to several plants that bear nodding, bell-shaped flowers. The Virginia cowslip, bell-flower and harebell are all called bluebell in the localities where they grow. The harebell is the bluebell of Scotland, famed in song and story.

BLUEBIRD, one of the favorite wild birds of the United States and Canada, loved for its bright color and pretty ways and its sweet song. The bluebird appears among the earliest of the birds that go north in the spring, and, if undisturbed, it stops in the

Northern states and builds its nest fearlessly in a hollow stump, fence post or other retreat very near houses and people. The same pair will nest year after year in a place that they find to their liking. They are fine songsters, and their cheerful notes may be heard throughout the entire season, though most frequently in early spring. The bluebird is a small thrush, with bright blue back, reddish throat and breast and white under parts. It is frequently disturbed by the English sparrow, and has been practically driven from some localities.

BLUE BONNET, a species of wild lupine that grows in abundance on the Texas prairies. On account of its wide prevalence and beauty it was selected as the state flower of Texas. The flowers resemble those of the sweet peas to which they are related.

BLUE BOOKS, the official reports, papers and documents printed for the British government and laid before the Houses of Parliament, so called from their being stitched up in dark-blue paper wrappers. They include bills presented to, and acts passed by, Parliament; all reports and papers called for by members, or granted by government on particular subjects, and the reports of committees. In the United States the name is applied officially to lists of persons in the government employ, and to the manual which contains regulations for the navy.

At intervals the principal nations publish books declaring their policies on questions involving international relations. These are named according to the color of the binding, as the Belgian *Gray Book*, the British *White Paper*, the French *Green Book*, etc. Many nations do not issue such volumes.

BLUEFIELD, W. VA., founded in 1888 and incorporated in 1893, is in Mercer County, at the extreme southern end of the state, on the Norfolk & Western Railroad. There is a Federal building, and nearby is Concord College. There are railroad shops and important soft coal mining interests. It is governed on the city manager plan. Population, 1930, 19,339. The city adjoins Bluefield, Va.

BLUEFIELDS, NICARAGUA, a city situated on the Mosquito Coast near the mouth of the Bluefields River. It has a land-locked harbor, and is connected with Galveston and New Orleans by direct lines of steamers. The shipments are large, and consist mostly of bananas and other tropical fruit. It is

the seat of a United States consular agency and a Moravian mission. Population, about 5,000.

BLUEFISH, a sea fish, common on the eastern coasts of America, allied to the mackerel, but larger, growing to the length of three feet or more, and much esteemed for the table. It is very destructive to other fishes, probably destroying scores of billions of small fishes every year. Bluefish are taken in nets and by hook, furnishing by the latter method great sport.

BLUE GRASS, an American pasture grass of great excellence, especially abundant in Kentucky, which is known as the Blue Grass State. Blue grass thrives best on clay soils overlying limestone, and it is excellent for lawns.

BLUE JAY. See **JAY**.

BLUE LAWS, a name for certain laws formerly believed to have been made in the early government of New Haven, Conn., but now known to have been the product, in large part, of the brain of Rev. Samuel Peters, a minister who was driven from the colony to England, and who thereafter devoted himself to ridiculing the Americans. Among those which he declared had been passed were the following:

No food or lodging shall be offered to a Quaker, Adamite or other heretic.

No one to cross a river on Sunday but an authorized clergyman.

No one shall run on the sabbath day, or walk in his garden, except reverently to and from meeting.

No woman shall kiss her child on the sabbath or fasting day.

No one shall buy or sell lands without permission of the selectmen.

Whoever wears clothes trimmed with gold, silver, or bone lace above two shillings by the yard, shall be presented by the grand jurors, and the selectmen shall tax the offender at 300 pounds estate.

No one shall read common prayer, keep Christmas or saint-days, make minced pies, dance, play cards, or play on any instrument of music, except the drum, trumpet and Jew's-harp.

Every male shall have his hair cut round according to a cap.

Blue Laws of To-day. In modern times certain restrictions in regard to matters of personal conduct are often called blue laws. Regulations in respect to liquor drinking, to strict observance of the Sabbath and the like are considered blue laws by those who are opposed to such restrictions as an infringement on personal liberty.

BLUE MOUNTAINS, the name applied to several ranges of mountains in different parts of the world: (1) The Blue Mountains of New South Wales, which run nearly parallel to the coast and form a part of the mountain system of Australia. This range extends from Wilson's Promontory on the south to Cape York on the north, and has an altitude of over 4,000 feet. (2) The Blue Mountains of Jamaica. These form the most important range of the island and traverse it nearly its entire length. Their greatest altitude is nearly 8,000 feet. (3) The Blue Mountains of New York, New Jersey and Pennsylvania, more properly known as the Kittatinny. These mountains are east of the Blue Ridge and should not be confounded with them. (4) The range of mountains in Oregon and Washington. They separate the Columbia River from the Great Basin and have an altitude of from 8,000 to 9,000 feet.

BLUE PRINT, a photographic picture obtained by the use of a cyanide. The process is in common use by architects and engineers for copying plans. The sensitive paper is prepared by being brushed over with a solution of oxalic acid and iron and then being treated with a solution of potassium ferrocyanide. When this paper is exposed to light under the drawing, which is made on vellum or other very translucent paper, a photograph is imprinted upon the sensitive paper. On washing in pure water, this is developed in the form of a blue print. The lines of the drawing protect the cyanide from the action of light, and in washing those portions are dissolved, leaving upon the picture white lines in place of the black lines in the drawing. Sunlight or electric light may be used for the process. Blue prints of photographic negatives can be made in the same manner.

BLUE RACER, a name often applied to the blacksnake (which see).

BLUE RIDGE, the most easterly ridge of the Alleghany or Appalachian Mountains. It extends from West Point, N. Y., to the northern boundaries of Alabama and Georgia. In the southern portion it is crossed by several ranges, the most important being the Black Mountains, the Nantahala and the South Mountains. The name Blue Ridge refers properly to that portion of the range which crosses Virginia and separates the Piedmont region from the Great Valley. The most elevated summits are the Peaks of Otter (4,000 feet), in Virginia.

"BLUE SKY" LAWS, a term applied to laws which regulate the issue and sale of stocks and bonds by corporations. These laws are designed to protect credulous buyers from fraud. Many corporations advertise generous dividends, when in reality they have little security, and millions of dollars are lost every year by investors who are deceived by glowing promises. Many States have passed laws to check the evil. Usually these laws require dealers in stocks and bonds to operate under a State license, and they must file with State authorities full information concerning their securities.

The United States passed the "Securities Act" in 1933, which was calculated to guard the investor against misinformation concerning security offerings. Under this act, information about forthcoming security issues must be registered with the Federal Trade Commission, officers are held to personal responsibility concerning their offerings and remedies are provided in case of fraud and misrepresentation. Certain Federal, State and municipal issues are exempted from this regulation.

BLUE VITRIOL, a compound of copper and sulphuric acid having the chemical name of copper sulphate. It appears in the form of dark blue crystals, and is obtained as a by-product in refining gold and silver with sulphuric acid. The compound is employed in calico printing and in dyeing, in the making of electrotypes and in copperplating, in electric batteries, as a preservative of timber and in the making of other copper compounds. Blue vitriol is poisonous and is an effective ingredient in mixtures used to kill insects. On exposure to the air the blue crystals turn white and crumble.

BLUNDERBUSS, an old-fashioned smooth-bore gun, the barrel of which terminated in a somewhat bell-shaped muzzle.



BLUNDERBUSS

Several bullets could be put in at one load. It made an effective weapon at short range, because the charge always scattered in all directions. No one hears the name anymore except in a figurative sense. A person who is clumsy in his movements or wastes his

energies by lack of concentration is sometimes called a blunderbuss.

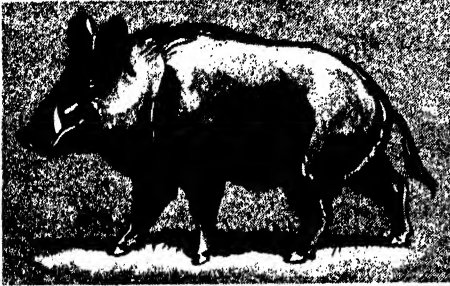
BLUSH'ING, or the reddening of the face and neck through modesty, confusion or shame, is a local modification of the circulation of the blood. Certain nerves are stimulated and as a result the arteries expand and more blood flows through them. The cheeks become red, or the flush may extend to the roots of the hair or "all over." Sensitive people blush readily. One who is too calloused to blush is said to be *unblushing*, or hardened.

Terror causes other nerves to be stimulated, and the tiny blood vessels contract instead of expand. As a result the blood flow is lessened and the skin becomes pale. Mark Twain said, "Man is the only animal that blushes—or needs to."

BO'A, a group of South American serpents of great size and enormous strength. They seize and crush in the folds of their strong bodies animals as large as sheep and deer, and, having broken the bones, they are able to swallow the animals entire, the neck stretching to many times its own diameter. After eating, the snake remains sometimes for several weeks without motion and seemingly more than half asleep. The *boa constrictor*, which rarely exceeds twelve feet in length, is not one of the largest of the boas, but the name *boa constrictor* is often given by the public to any large serpent of similar habit; consequently, the term in common speech includes the pythons of the Old World and the anaconda and other large serpents in America. The only members of the *boa* family in the United States are two or three small species found in and around Arizona. See PYTHON; ANACONDA.

BOABDIL, *bo ahh deel'*, or **ABU-ABDUL-LAH**, *ah boo'ah dil'ah*, the last of the Moorish dynasty in Granada, Spain. Boabdil seized the throne from his father in 1482, but was unable to hold the allegiance of his subjects, and early in 1492 his kingdom was overpowered by Ferdinand and Isabella, of Castile and Aragon, who have a small but conspicuous place in American history. The spot where the king is said to have taken his last view of his lost kingdom is exhibited to travelers as the "last sigh of the Moor." Tradition says that Boabdil was killed while fighting in Africa in behalf of the ruler of Fez.

BOAR, *bor*, the wild hog of Europe and North Africa. The boar-hunt on foot, with spears for weapons, was once the favorite amusement in England and Northern Europe. The boar was very strong, fierce and fleet, and was armed with curving tusks, which could inflict dangerous wounds. The chase was therefore very exciting. In India a popular sport is to hunt the native boar on horseback. Boars are much larger than



WILD BOAR

domesticated hogs and are covered with short hair and stiff bristles, which form a crest along the spine. They feed in the night time on vegetables of different kinds.



BOARD OF TRADE, an organization of men who deal in produce, particularly in wheat, oats, corn, etc., and partly through whose operations the prices of these commodities are fixed. The value of products is regulated by the law of supply and demand; boards of trade have definite knowledge of crop prospects, the quantities of grain on hand in all countries, and the approx-

imate needs of all peoples from one harvest to another. The market price of a grain changes from day to day as crop prospects or demands for cereals fluctuate. If wheat on a certain date is quoted at \$1.50 per bushel and the next day come reports of disaster to the growing crop over a wide area, the price advances; if reports show that all over the wheat-growing sections of the world there are prospects of a crop in excess of expectations and of needs, the cereal becomes less valuable per bushel in the estimation of boards of trade, and the price declines. These statements summarize the situation in normal

times; in periods of great disorder, like the World War, abnormal conditions compel government control and price-fixing.

Trading on "Margins." The practice of buying and selling on "margins," which means cash security advanced to protect the agent against loss, has grown to be a leading feature on boards of trade. According to this method of dealing, the trader deposits with his broker a sufficient amount to cover the ordinary fluctuations of the commodity bought or sold, and the broker furnishes the rest of the necessary capital. For instance, in January the trader wishes to buy 5,000 bushels of wheat for delivery in February. If the present price is \$1 a bushel, he advances his broker \$250, which is a margin of five cents a bushel. If the price of wheat advances, he can order the broker to sell it, and if he chooses, withdraw his margin as well as a profit, according to the extent of the rise. If the price recedes below \$.95 or below the point where his margin will cover the loss, he must either deposit enough margin with his broker to cover the falling off or lose what he has advanced.

A "Corner" in Grains. In business a "corner" is an apparent scarcity of a commodity, created by a combination organized for the purpose of holding the article affected off the market, in order to extort abnormally high prices. The most memorable attempted wheat corners on the Chicago Board of Trade occurred in May, 1867, when the price of wheat was forced to \$2.85; in September, 1888, when wheat sold as high as \$2.00; and in May, 1898, when it went to \$1.85, on account of the Leiter deal.

"Long" and "Short" Transactions. The distinction between so-called *long* and *short* transactions is as follows: In the former, the trader buys, expecting a later advance in price to net him a profit; in the latter, he sells, expecting a subsequent decline. This is known as dealing in "futures."

Board of Trade Rules. Most boards of trade have their own clearing houses, and at the end of each business day all parties who have been trading on the board must send reports of sales and purchases to the clearing house. Those whose reports show net loss must send certified checks for the amount, and those who have made net gains are paid. By common consent a basis of grading and inspection of grains and provisions has been established throughout the United States, in

which all the boards of trade unite. White winter wheat is divided into numbers 1, 2, 3 and 4; long red winter into numbers 1 and 2; hard winter wheat into numbers 1, 2, 3 and 4; red winter wheat into numbers 1, 2, 3 and 4. Spring wheat is classed as numbers 1 and 2, northern spring; numbers 1, 2, 3 and 4, spring. The same close discrimination is made with regard to corn, oats, rye, barley and all other articles.

The most stringent regulations are made to prevent fraudulent practice on the board. The smallest fraud on the part of any member, however prominent he may be, is punished by immediate suspension, and his trial is prosecuted with a rigid impartiality not surpassed by the courts of law. There is a widespread misunderstanding in regard to transactions on the board, many persons believing that no property is transferred in purchases and sales on margins, whereas the rules of the board not only contemplate the delivery of all property bought and sold on the floor, but express provision has been made therefor, and strict penalties are prescribed for all damages that may arise in case of nondelivery upon the maturity of a contract. A board of trade contract matures on the last day of the term mentioned in it, and all transactions between members for purchases or sales on the floor of the board are strictly contracts under its rules.

How Purchases and Sales Are Made. In the midst of all the noise and confusion which the outsider observes on the floor of the board during the hours when it is in session, there is a vast and thoroughly systematized volume of business being transacted

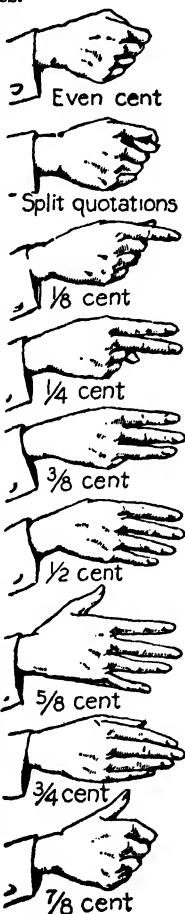
with a facility and celerity utterly incomprehensible to the uninitiated. The brokers on the Chicago Board of Trade, for example, have a sign language peculiar to themselves, by which they can make themselves understood above the din constantly prevailing. A sign made with the open hand of the broker toward the person he is in communication with, signifies "sell"; if he shows the back of his hand, it means "buy"; one finger raised means 5,000 bushels or other units of the article dealt in; two fingers raised signifies 10,000 bushels, and so on.

The sign manual of the trader in the "pit," as the spot where business is transacted is called, is simplicity itself. For instance, wheat having sold at 90 cents, a trader catches the eye of someone opposite in the pit who has 10,000 bushels to sell, and signals that he will take the "10" wheat at 90. The seller, in reply, holds up his right hand with the index finger extended horizontally, indicating he wants $\frac{1}{8}$ cent more than the price quoted, or 90 $\frac{1}{8}$ cents. The buyer motions acceptance and signals back " $\frac{1}{8}$." The seller and buyer then note on their cards "Sold 10 at $\frac{1}{8}$, Jones;" and "Bought 10 at $\frac{1}{8}$, Smith," respectively, the number of bushels bought and sold always meaning so many thousands. After leaving the pit the two traders meet and check the operations.

Principal Boards of Trade. Liverpool is the world's center for distribution of grain; Chicago, in the midst of the grain areas of the United States, is the greatest distributor in America. Therefore the boards of trade in these two cities are powerful in affecting prices. Their daily quotations are telegraphed all over the world, and tend to stabilize values everywhere.

Organizations of citizens in cities or larger communities for purposes of the general welfare are sometimes called "Boards of Trade." The usual term is "Association of Commerce" or "Chamber of Commerce" (which see).

BOAT, a small open vessel or water craft moved by oars, by sails or by gas or electric power. At what point in the development of the boat did it cease to be a boat and become a ship has never been stated with exactness. According to the above definition, the Viking vessels of the north country in early Europe were really boats, for they were open and were propelled by oars; but as some of them were about 80 feet long and 16 feet wide and



THE SIGNS

Each position of the fingers indicates a different fraction of a cent.

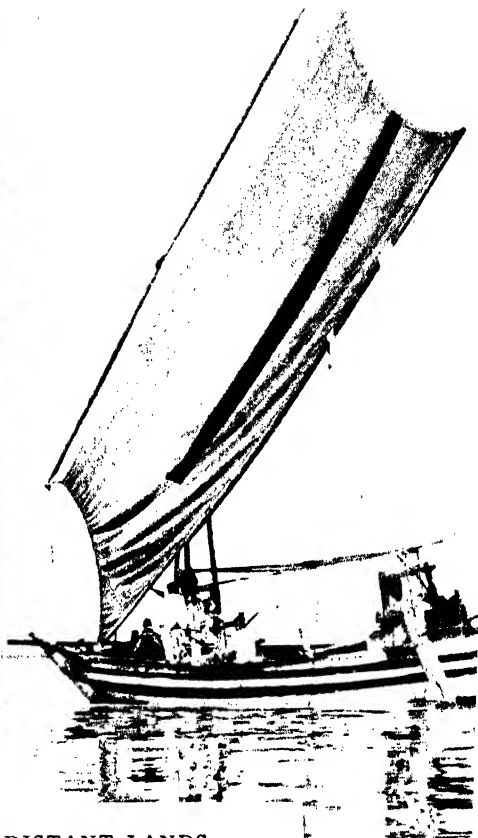


were equipped with sail, they have always been called ships (see **NORTHMEN**). It is quite certain that some of these vessels reached the shores of North America.

The war vessels of Phoenicia, old Greece, Rome, and Carthage were likewise ships. They were developed first with two rows of oars, one above the other, on each side of the vessel, and they were ships, because they were enclosed, and the slaves who rowed them toiled below the decks. Those with two banks of oars were known as biremes; with three, triremes. Carthage built the quinquereme, with five banks of oars, and Rome was quick to duplicate it. The dividing line between boats and ships is therefore to great degree one of size and whether open or enclosed below decks.

Throughout the centuries man's ingenuity has devised boats of many forms; they vary in detail according to the uses to which they are put. Some of these, because of their size, may properly be referred to as ships, but here again distinctions may be lost. The punt and the dory, described later, are flat-bottomed. A narrow and therefore swift variety, usually with a square-cut stern, is called a cutter; other names which apply to this kind of vessel, with some variations in form, are dingey, launch, gig, and barge. The whaleboat and lifeboat are pointed at both ends. The narrowest of all boats in proportion to length is the intercollegiate racing shell; each of its nine seats will accommodate but one person. Ocean steamers are equipped with boats sufficient to accommodate all on board in case of distress at sea; on the most modern ships these are usually motor-driven.

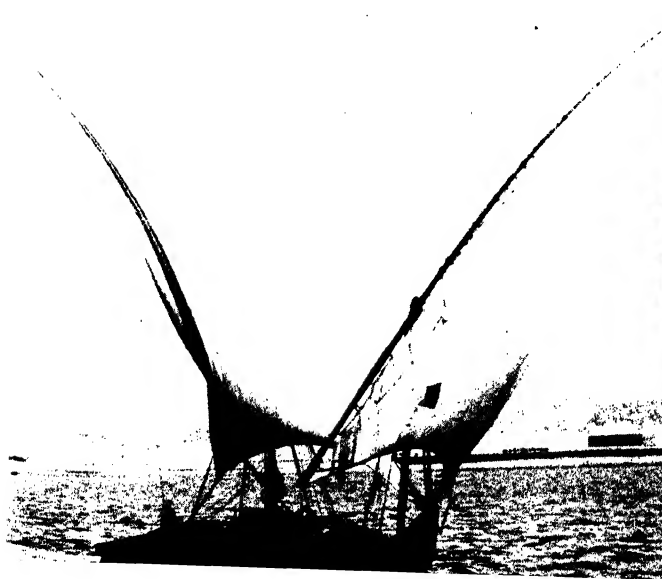
Earliest Boats. Many thousands of years ago man had little intelligence, but early he learned one thing about travel. If he lived near a river and wanted to go downstream he could roll a log into the water and sit astride it and float to his destination; it was easier than walking, but he could not float back. One day on a river where the current was sluggish, he learned that by using a pole against the bed of the stream he could make headway in the opposite direction; soon he discovered that with a flattened stick (which later became our oar) he could increase his speed upstream. Then the slowly dawning mental power of the savage led him to hollow out the log, and legs were withdrawn from the water to the dry interior.

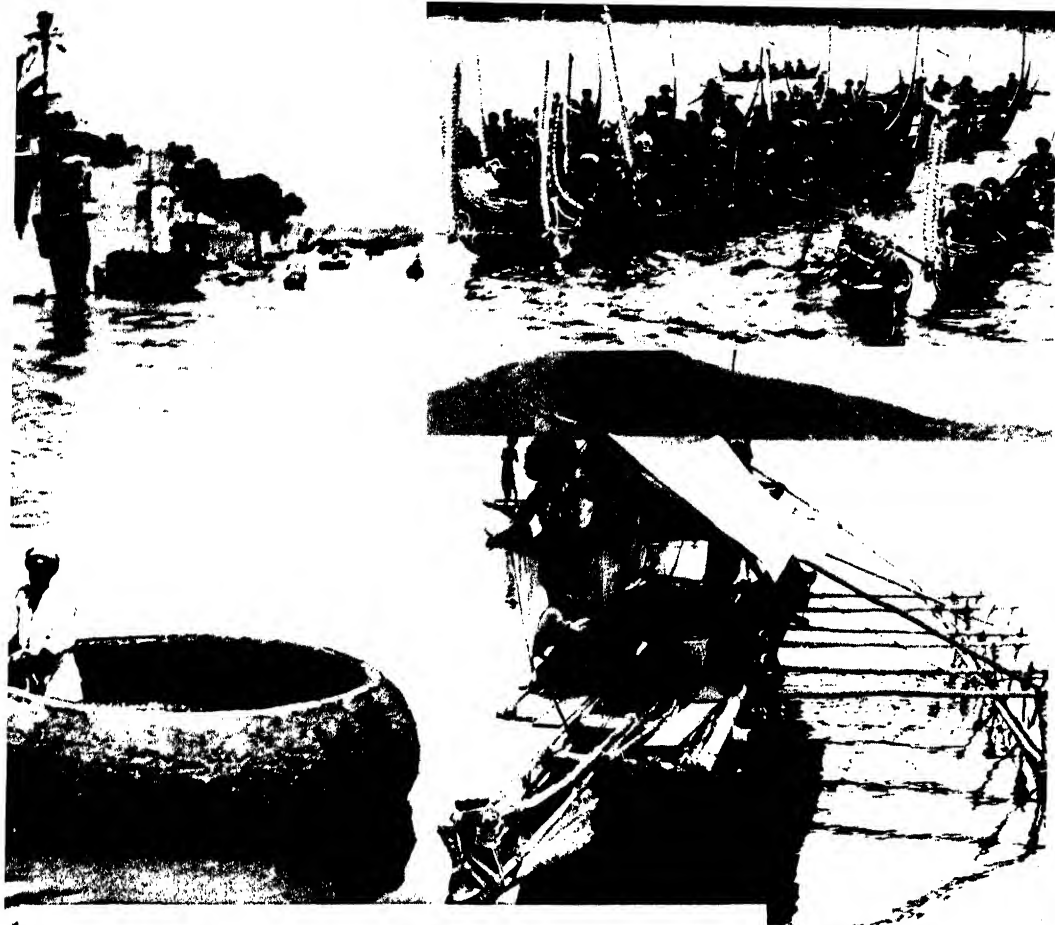


WATER CRAFT FROM DISTANT LANDS

The "floating cities" of China; teeming river life of Borneo; native fishing craft of the Dutch East Indies; gull-like dhows of Egypt; and gondolas on the canals of Venice, express the individual social needs of their builders.

Fishing Galloway





STRANGE CRAFT

For centuries such craft as the circular boats of the River Tigris; war canoes of the headhunters of the Solomon Islands, strange out-rigger canoes of the Papuans, and the kayaks of the Eskimo have plied tropical and Arctic waters.

Ewing Galloway



This improved device became known as the *dugout*.

The dugout was an advance step, but it would capsize and spill the occupants, so even earlier and as a safety device two or more logs were fastened together by thongs, and the *raft* appeared. Then dull stone axes and the use of fire evolved the flat-bottomed log; this was soon hollowed out on top, and man's first boat appeared. Among some primitive peoples today it is the only means of water transportation. The savage found that by erecting a pole and crossbar in his boat and stretching a skin across, the wind would carry him more rapidly than ever he had traveled before, and without expenditure of effort. Thus from such rude beginnings have developed through the ages the considerable variety of boats which in the present day are models of comfort and economic value.

Modern Boats. Brief descriptions of some vessels classed as boats will be of interest to all who favor water recreation.

Punt. This is a narrow, flat-bottomed boat, from six to ten feet in length and three to four feet wide, usually propelled by a pole. It is more common on quiet waters of Europe and Asia than in America, is an excellent boat for fishing, on being towed to fishing grounds, and for transportation of bulky freight for short distances. The punt is difficult to capsize.

Canoe. The first canoes as we know them were made probably by the American Indians, and so adept were these artisans that some of these craft possessed artistic merit. The Indians made them by stretching skins from animals over frames of wood—cedar, where it was obtainable; often birchbark was used instead of skins, but in either instance savage skill made them water-tight. Canoes do not possess keels, therefore they are easily overturned. They do not have bows or sterns, but are pointed at both ends. The length varies from eight to eighteen feet, and the modern canoe of light wood weighs from 40 to 60 pounds. They are propelled by a single paddle, usually, wielded alternately from side to side. A sail may be hoisted by a venturesome canoeist, but it may prove a dangerous accessory in a sudden gust of wind; therefore, a sail on a canoe is not to be recommended.

Outrigger. A boat of remote antiquity is the outrigger canoe, ingeniously fashioned



to prevent capsizing. The outrigger is a simple device which can be attached to any boat. It consists of two or more poles, usually of bamboo, extending outward from the side of the boat, parallel to each other and connected at the outer ends by a cross-bar with curved ends; this floats on the water. Usually a boat has only one outrigger, though there may be one on each side, to assure greater safety. Outrigger canoes are seen in great numbers in the islands of the South Seas; many are large enough to carry 40 or 50 people.

Kayak and Umiak. The boat exclusively used by one person among the Eskimo is the kayak (pronounced *ki'ak*), a canoe type, propelled by a double paddle. The builder secures poles of driftwood for the frame, and over this he stretches skins of walrus or reindeer, including the open top, except that he leaves an opening only large enough to admit his body. To make the top watertight, he sews a flap around the hole and with a drawstring of hide, pulls the flap so tight that no water can enter. Even if he capsizes, the occupant will remain dry from the waist down. The umiak is larger, with open top, and may carry from a dozen to twenty persons ordinarily, and sometimes more, on journeys of many miles.

Coracle; Koofah. In Wales, in very ancient times, a circular bowl-like device had two large circular rings of wood held apart by upright braces; covering the sides and bottom were skins or bark. It was called a *coracle*, which is Welsh for *round body*. Even today occasionally one sees a coracle on a Welsh stream. But in old Mesopotamia, now Irak, on the Tigris and Euphrates rivers, adding romance to ancient Baghdad, almost the same vessel is used today, and its Arabic name is *koofah*. A koofah may be large enough to float several men and a horse or two. Here is a remarkable instance of the persistence of old times extending into the modern period, for they were used, in the same form, during the Middle Ages.

Sailboats. Elsewhere will be found an article dealing with sailboats and sailing, relating particularly to modern countries in the present day. It will be of interest here to refer to some strange sails which dot rivers and lakes in remote lands.

In Egypt navigation is practically limited to the River Nile and to some parts of its vast delta. Here the traditional vessel is

known as the *dhow* (pronounced *dou*); it has two sails, with sharply pointed tips at their upper ends. Some of the peculiar features of these vessels are symbols of the ancient faith of the people.

The Chinese *junk* is as much a ship as a boat. It rests rather high in the water; the stern is more elevated than the bow, and it may have one or two sails. These boats swarm upon the great rivers throughout the country.

Motor-Boats. Since the development of the internal-combustion engine, boats both small and large have been quick to utilize this power. In a small motor-boat the motor may develop only two horse power; in larger ones motors of a hundred horse power are not uncommon. Some great ocean ships are also motor-driven. The power is sent from the motor through the propeller shaft to the propeller at the rear.

The *outboard motor* is very popular. It is attached to the stern of a rowboat. The propeller is geared to a vertical shaft, and this to the small motor; energy of the motor is transformed into mechanical energy in the propeller. The outboard motor is very noisy, as it is impossible to silence the motor's explosions. Such motors develop from one to fifty horse power, and the newest models are streamlined.

Boats as Homes. Some parts of the world are so densely populated that there is not room for all of the people on land. On American rivers and lakes one may see an occasional houseboat—a small vessel whose cabin occupies nearly all of its deck space and is divided into living rooms. On such a boat the owner and his family spend pleasant vacations. Picture to yourself certain Chinese rivers to whose shores so many boats of this kind are moored that they actually touch one another. On them live more than a million people. The Pei-kiang River at Canton holds a population of half a million in boats. Some of the occupants may go ashore in the daytime, but seldom spend a night off their boats. Children are born, live their lives and die knowing no other homes. In nearby Hong Kong a great many thousand people live in houseboats; here is the second largest colony of the kind in the world.

Related Articles	Consult the following
titles for additional	information:
Canoe and Canoeing	Sailboat and Sailing
Motor Boat	Ship
Rowing	Yacht and Yachting

BOATBILL, a South American heron which differs from its relatives in having a broad, heavy bill and rather short legs. The bill itself is not unlike a boat with the keel



BOATBILL

uppermost, and on the lower side is a pouch in which food can be carried. The boatbill lives in South America and takes its food from the streams, which it watches from an overhanging limb.

BOATSWAIN, a warrant-officer on ship-board in navies, and also on many commercial vessels. In the days of sail his was an office of importance, for he had charge of sails and rigging. In the navy today he assists the officer in charge of the deck, summons the crew when required, and in rank is below the lowest commissioned officer. On commercial vessels he takes rank below the most junior of the mates. In the navy of the United States he secures appointment through competitive examination; and in ten years advances to chief boatswain.

BOBOLINK, one of the most pleasing of the song birds that nest in the Northern States and Canada. The male is a handsome fellow, generally black, but wearing a buff cap, shoulder straps and band across the back. The female, who is dull and streaked with yellow, builds her nest on the ground in the tall grass. She tends the nest, but the male protects her and sings almost without stopping from the tops of brush or high weeds near by. His name is given because his clear notes resemble the word.

Bryant, in his *Robert of Lincoln*, describes the bird in charming verse:

Merrily swinging on brier and weed,
Near the nest of his little dame,
Over the mountain-side or mead,
Robert of Lincoln is telling his name:

Bob-o'-link, bob-o'-link,
Spink, spank, spink.
Snug and safe is that nest of ours,
Hidden among the summer flowers
Chee, chee, chee.

When the nesting season is over, the bobolink loses his brilliancy and, joining with others of his kind in large flocks, flies to the reeds and marshes of the seacoast and inland waters. Here he becomes very fat and his flesh is esteemed as the greatest of delicacies. He loses, too, the name of bobolink and is known to the hunters and to epicures as a *reed bird*, or *rice bunting*, when he feeds in the rice fields. Because of its being hunted so much in the South, the bobolink is protected by law from indiscriminate slaughter.

BOCCACCIO, *bok kah'cho*, GIOVANNI (1313-1375), an Italian novelist and poet, son of a Florentine merchant. The *Decameron*, on which his fame rests, consists of one hundred tales, supposed to have been related in ten days by a party of ladies and gentlemen who had withdrawn to a country house near Florence, while the plague was raging in that city. These stories, told swiftly and vividly, are full of wit and beauty, but they are marred by their licen-



BOBOLINK

tious tone. For this, however, the age, which permitted and even demanded such things, is to blame, rather than Boccaccio himself.

Boccaccio was remarkably precocious, and wrote verses before he was seven years of age. Nevertheless, by his father's wish, he spent some years unprofitably in the study of the canon law; he was able to devote

himself to literature only after he had taken his degree in law. Previously, his father had attempted to train him for a business career. In 1331, while Boccaccio was pursuing his studies in Naples, he fell in love with Maria, daughter of King Robert, then ruler of the city state. At her command he wrote his first work, *Filocolo*, a love story in prose. During this period he also composed the poems *Filostrato* and *Teseide*, in which he used an eight-line stanza afterward employed by Byron in *Don Juan*. While in Naples, Boccaccio saw and was inspired by the poet Petrarch, who became the best friend of his maturer years. The *Decameron* was completed in 1353. Boccaccio experienced religious conversion in 1362, and took vows of priesthood. Forsaking his dissolute habits, he devoted himself to theology and to the collection of valuable manuscripts, many of which he rescued from oblivion. In 1373 the Florentine magistrates appointed him a lecturer on Dante's *Divine Comedy*.

BOCHUM, *bok'um*, GERMANY, a city in the Prussian province of Westphalia, nine miles east of Essen, in the heart of the heavy industries section of the country. It is one of the greatest manufacturing cities of Germany, for it is in the vicinity of the iron and coal deposits, and here are great iron and steel plants. In 1910 its population was about 135,000, but during the World War this increased to nearly 775,000, for Bochum was one of the largest makers of munitions during the four years of war. Besides the steel industry today, the city is famed for its tin and zinc works. Though a factory town, it is notable for its beautiful residential sections set apart from the industrial area. Population, 315,000 (1933).

BODLEIAN, *bod'lean*, **LIBRARY**, a famous library of Oxford University, founded by Sir Thomas Bodley in 1598 and opened in 1602. Sir Thomas presented to the library his valuable collection of books and manuscripts and provided for an endowment fund. Many other bequests have made the Bodleian Library unique in its field. It has prized Greek and Roman manuscripts, rare volumes on Hebrew, Arabic and Biblical subjects, and priceless collections of medals, coins and prints. A copy of every book published in Great Britain is deposited with the library. There are reference and reading rooms for the public. In 1932 the library trustees accepted \$2,300,000 from the Rockefeller

Foundation for expansion of the building plant.

BOEHMERIA, *bome'riah*, a genus of plants closely resembling the stinging nettle. One species is the Chinese grass, which is shrubby and three or four feet high. It is a native of China, Southeastern Asia and the Asiatic Archipelago, and it has long been cultivated there and in India. From its fibers is made a beautiful glossy fabric called China-grass cloth. Ramie is a species of boehmeria whose fiber is utilized in making cordage, banknote paper, nets and cloth. The cultivation of Chinese grass is carried on to a small extent in California.

BOEOTIA, *be o'shi a*, in ancient times a division of Central Greece, lying between Attica and Phocis. The surface is generally level and forms a basin in which lies Lake Copais, into which the Cephissus flows. South of the lake are the famous Helicon Mountains, the seat of the ancient worship of the Muses. The earliest settlers were Pelasgians and Phoenicians. They were conquered in 1124 B. C. by an alien people calling themselves Boeotians. These people organized the Boeotian League, a confederacy consisting of fourteen independent cities with Thebes at its head.

In the Persian Wars Boeotia sided with Persia, and during the Peloponnesian War it was the bitterest enemy of Athens, though from 456 to 487 B. C. it had belonged to the Athenian League. The Boeotian League was at the height of its power under Epaminondas and Pelopidas and fought desperately against Macedonia. The League was finally dissolved by the Romans in 171 B. C. The Boeotians were always regarded as stolid and unimaginative, and most of them cared but little for culture.

BOER, *boor*, a Dutch word which means peasant, and which is applied to settlers of Dutch descent in South Africa. See TRANSVAAL, THE; SOUTH AFRICAN WAR.

BOER WAR. See SOUTH AFRICAN WAR.

BOG, a piece of wet, soft and spongy ground, where the soil is composed mainly of decaying and decayed vegetable matter. Such ground is valueless for agriculture until reclaimed by drainage, but often yields an abundance of peat for fuel or muck for fertilizer. See MARSH.

BOG OAK, trunks and large branches of oak found imbedded in bogs, and so preserved that the grain of the wood is little

affected by the years of interment. It is of a shining black or ebony color and is frequently converted into ornamental pieces of furniture and smaller ornaments, as brooches, earrings, and the like.

BOGOTA, *bo go tah'*, COLOMBIA, capital of the republic and of the state of Cundinamarca, and one of the foremost centers of education in South America. The location is pleasant and healthful, and the water supply is obtained from mountain streams. Among the important public buildings are those of the university, the capitol, a public library, a museum and the National School of Fine Arts. Bogota is the largest center of internal trade of the country, and it has manufactures of soap, cloth and leather, though these are not of great importance. The city was founded in 1538 and soon became the capital of the province of New Granada. When the Republic of Colombia was established in 1819, Bogota became the capital of the new nation. Population, 1933, 264,000.

BOHEMIA, *bo hé'mia*, a province of Czechoslovakia, from 1526 to 1918 a province of the Austro-Hungarian Empire. In the thirteenth century Bohemia was one of the strongest kingdoms of Europe, but after 1526, when a Hapsburg king ascended the throne, it came under Austrian rule. In the latter part of the eighteenth century a national feeling developed, and for over a hundred years the dominant element in the population, the Czechs, struggled to keep it alive. When, in 1914, Bohemia was swept into the struggle that became the World War, the Czechs seized the opportunity to further their own cause. Thousands of the soldiers deserted to the allies, and in 1918, when the Austro-Hungarian monarchy was tottering to its fall, Bohemia joined with Moravia, Silesia, Slovakia and Ruthenia, and formed the republic of Czechoslovakia.

Location, Area, Population. Bohemia occupies a section in the northwestern corner of what was formerly Austria-Hungary. German Bavaria lies to the southwest of it, Moravia to the east and southeast, and parts of Germany to the west and north. The area is about 20,000 square miles, a little more than that of Vermont and New Hampshire combined. Next to Galicia, Bohemia was the largest Austrian province. In 1921 the population was 6,670,000; in 1931 it was estimated at 7,100,000, or about 353 persons to the square mile. Prague, the capital, was

second in population among Austrian cities, ranking next to Vienna. As it is surpassed by Budapest, capital of Hungary, it was the third city in the Austro-Hungarian monarchy.

Resources. Austria valued Bohemia for its mineral wealth, as it was the richest province in coal, iron, silver and gold. Bohemia is also important as an agricultural section, though the soil has been drawn upon for hundreds of years. Wheat, oats, rye, barley, potatoes, hops and sugar beets are the staple products. Almost all the land is under cultivation; small farms are the rule, and intensive cultivation is practiced. Notable among the manufactured products are china-ware and beer; the city of Pilsen is famous for the latter, and Carlsbad for the former.

History. Bohemia was first settled by the Boii, who were driven out by the Germans during the first century B. C. In the ninth century Christianity was introduced by the Germans, and soon after this Bohemia became a part of the Moravian kingdom of Svatopluk. From the early part of the tenth century to the fourteenth the country was tributary to Germany, and during this time its interests were greatly advanced. From 1278 to 1305 Bohemia was one of the most powerful kingdoms of Europe and extended its sway from the Elbe to the Adriatic. Soon after this the control passed to the House of Luxemburg, where it remained for more than a century, and several of the kings of Bohemia were emperors of Germany. About 1400 the religious movement inaugurated by John Huss occurred, and this brought on wars which lasted for a number of years, during which the Czechs were enabled to stay the influence of the Germans. In 1526 the country came under the rule of the Hapsburgs, remaining dependent on Austria until 1918, as related above.

Related Articles. Consult the following titles for additional information:

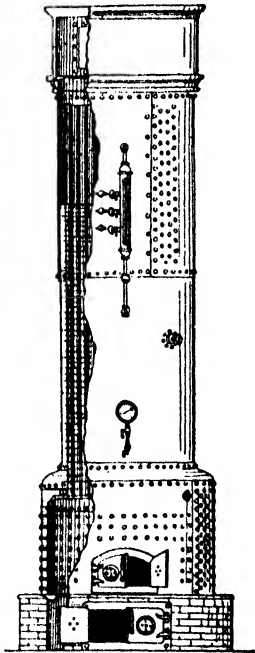
Austria	Pilsen
Czech	Prague
Czechoslovakia	Reformation, The
Huss, John	Thirty Years' War
Masaryk, Thomas G.	World War

BOIES, *boiz*, HORACE (1827-1923), an American lawyer and politician, born at Aurora, Erie Co., N. Y. He moved to Wisconsin territory in 1844, worked on a farm for six years, later studied law in New York state and was admitted to the bar, beginning practice at Buffalo in 1849. He was elected

to the legislature in 1858 as a Republican, but moved in 1861 to Waterloo, Iowa. There he left the Republican party, owing to opposition to a high tariff, and in 1890 was elected governor, being the only Democratic governor of the state since the Republican party was organized. He was a prominent candidate for the Democratic nomination for president in 1896 and was defeated for Congress in 1902.

BOIL, a small, painful swelling of a conical shape on the surface of the body. Its base is hard, while its apex is soft and of a whitish color. Boils are caused by poisonous bacteria, which find their way under the skin through a sweat gland or hair follicle. It is usually necessary to lance a boil to permit the discharge of pus. The discharges from a boil should be carefully kept from contact with the skin and should be burned with all the cloths used about the diseased part.

BOILER, a strong vessel made of iron, steel or copper plates riveted together and used for producing steam under pressure. Boilers are used for supplying engines with steam, warming buildings and for certain manufacturing processes. Since they generate steam under high pressure, the first essential of boilers is that they be of great strength. They are of cylindrical form, usually with ends curving slightly outward. The greatest care is observed in their construction, and strict attention is given to the minutest details of design in order to provide strength.



VERTICAL FIRE-TUBE
BOILER

The essential parts of a boiler are the *shell*, or envelope; the *flues*, or tubes through which the gases from the fire pass; the *furnace*, which holds the fire; the *grate*, on which the fire is built; the *ash pit*, which is

under the grate and receives the ashes, and the *steam dome*, which is on top of the boiler and is used to collect the steam. Large boilers have numerous accessory parts which vary according to the size and pattern of the boiler. Certain accessory parts are necessary to all boilers. Among these are the *safety valve*, which is gauged to release steam when it has reached a given pressure; the *water gauges*, which indicate the height of water in the boiler; the *steam gauge* (see GAUGE, STEAM), which shows the pressure of steam, and the *pump* or *indicator*, which supplies the boiler with water.

There are many varieties of boilers, each of which is specially adapted to certain conditions. According to structure, boilers are classified into tubular, flue and water tube boilers, and according to their positions, as horizontal or upright. *Flue* boilers have one or more large flues passing through the interior. The heated gas passes through the flues, which are surrounded by water, thus bringing the heat into contact with all the water at nearly the same time. *Tubular* boilers differ from flue boilers only in having a large number of small tubes instead of one or two large ones. These utilize more heat than the flue boilers and are in general use on locomotives, for stationary engines and for heating large buildings. The *water tube* boiler is constructed so that the water is in tubes which are surrounded by the fire and burning gases. These boilers are considered safer than the old style tubular boiler; they generate steam very rapidly and secure a high pressure; consequently, they are in quite general use where high pressure is required.

Low-pressure boilers, in which steam can be sent through pipes when the pressure is as low as three pounds to the square inch, are used in buildings for heating purposes; in engines designed for heavy work high-pressure boilers are used, in which the pressure varies from 140 pounds upwards.

Boilers are built both vertical and horizontal; most small ones are of the former type, but the majority of large ones are of the latter. See STEAM ENGINE.

BOILING POINT, the temperature at which a liquid boils. The boiling point for water at sea level is 212° F. or 100° C. Ether boils at about 96°, alcohol at about 173° and mercury at 662°. Under the same conditions the boiling point for the same liquid is al-

ways the same. The boiling point is raised by increasing the pressure on the surface. Practical application of this principle is seen in cooking meat and vegetables by boiling. A tight cover on the kettle increases the pressure upon the surface of the water and raises the boiling point so that the cooking is accomplished much more quickly. The boiling point is lowered with the decrease of pressure. Since the pressure of the atmosphere is greatest at sea level, the boiling point is lowered with the increase of altitude, and on the high mountains it is so low that vegetables and meat cannot be cooked by boiling in an open kettle. This principle is used in the construction of vacuum pans, which are enclosed vessels connected with air pumps that exhaust the air and vapor from over the surface of the boiling liquid and thus reduce the pressure, making it possible to boil the liquids at a low temperature.

This principle can be illustrated by a simple experiment. Take a round-bottom flask or a common soda water bottle, fill it about half full of water, then place it in a kettle of water and gradually bring this to the boiling point. When the water in the bottle has reached the same temperature, remove the bottle, cork it tightly and invert it. Place a damp cloth on it, and upon this pour cold water. The cold water condenses the steam, and the water in the bottle immediately begins to boil. By taking care the water can be made to boil three or four times. Placing salts or other substances in water usually raises the boiling point, while the injection of gases into a liquid usually lowers the boiling point.

BOIS DE BOULOGNE, *bwah de boo lo' ny'*, a pleasant grove near the gates on the west side of Paris, so named after the suburb Boulogne-sur-Seine. Its trees were more or less destroyed during the Franco-German War. It is still, however, one of the pleasantest Parisian holiday promenades and one of the most beautiful parks of the city. See PARIS.

BOISE, *boi'ze*, IDAHO, the capital of the state, its largest city, and the county-seat of Ada County, on the Boise River and the Union Pacific Railroad. It is in an agricultural and mining district and is one of the largest wool markets in the United States. Water is derived from the river for irrigation and for power in manufacturing. Natural hot water gushes forth from a flowing

well and is extensively used in heating buildings. Important institutions are a large enclosed natatorium, Idaho State Museum, a Carnegie Library, several schools for higher education, business colleges, the United States assay office, a state capitol, costing \$2,000,000, a penitentiary and a soldiers' home. Near the city is Arrowrock Dam, ranked as one of the highest in the world (see IRRIGATION). Boise occupies the site of an old trading post of the Hudson's Bay Company and was settled in 1863. The city is governed on the mayor-council plan; the commission plan was tried for a time. There is one airport. Population, 1920, 21,393; in 1930, 21,544.

BOK, EDWARD W. (1863-1930), an American journalist to whose industry and talent is due much credit for the success of a leading publication for women. He assumed the editorship of that periodical in 1889, and relinquished it only a short time before his death. He married the daughter of the founder of the publication, and was its vice-president as well as editor, for forty years. Bok was born in the Netherlands, but emigrated to America when six years of age. After completing a public school education he began business life as an office boy. Later he worked as a stenographer in various publishing companies, and founded the Bok Syndicate Press before beginning his editorial career. Before his death he ordered the construction of the Singing Tower, in a bird reserve on the highest point of land in Florida. In 1921 he published *The Americanization of Edward Bok*, and also visited his native Holland. Upon his death in 1930 his burial place was located near the base of the beautiful Singing Tower.

BOKHARA, *bo kah'rah*, a state in Central Asia, formerly an absolute monarchy, but since 1924 a part of the Turkoman Socialist Soviet Republic, allied with the Soviet government of Russia. It is situated between Russian Turkestan and Afghanistan, has an area of 83,000 square miles—about that of Idaho—and a population of 1,250,000. The religion of the people is Mohammedanism. The former sovereign, Sayid-Mir-Alim Khan (born 1880), was expelled in 1919. The country is bordered on the north by the Hindu Kush Mountains, and on the east by the Bolor Tagh. Most of the region is a level plateau, covered with dry steppes and sandy wastes.

The important rivers of Bokhara are the Amu or Oxus, and the Samarcand. The climate is temperate, the rainfall light, and along the banks of the streams the land is fertile. The most important crops are cotton, rice, wheat, barley, fruits, silk and tobacco. The inhabitants are chiefly engaged in raising live stock, especially camels, goats and horses. The manufactures are few and limited. They include silk fabrics, gold and silver ornaments, firearms and sabers.

The country has considerable commerce with Russia. It is mostly by caravan, though there is one railroad, the Russian-Transcaspian, with 183 miles of track within the country. There is one telegraph line, from Tashkent, in Asiatic Russia (population 271,900) to Bokhara, the capital. The latter city has 75,000 people. The entire country was a part of ancient Bactria, and was conquered by Genghis Khan in 1219. About three centuries later it passed under the rule of the Uzbeqs. In 1864 it became subject to the Russian authorities and is still a dependency of Russia.

BOLEYN, *bull'en*, ANNE (1501?-1536), the second of the six wives of Henry VIII of England. She went to France with Mary, sister of Henry, at Mary's marriage with Louis XII, and on her return to England about 1522, became lady of honor to Queen Catharine. The king, who soon grew fond of her, without waiting for the official completion of his divorce from Catharine, married Anne in January, 1533, having previously created her Marchioness of Pembroke. Then Cranmer declared the first marriage void and the second valid, and Anne was crowned at Westminster with unparalleled splendor. In September, 1533, she became the mother of Elizabeth. She was speedily, however, in turn supplanted by her own lady of honor, Jane Seymour. Suspicions of infidelity were alleged against her, and in 1536 the queen was brought before a jury of peers on a charge



ANNE BOLEYN

of treason and impropriety of conduct. Smeaton, a musician, who was arrested with others, confessed, and on May 17 she was condemned to death. The clemency of Henry went no further than the substitution of the scaffold for the stake, and she was beheaded on May 19, 1536. Whether she was guilty or not has never been decided; that she was exceedingly indiscreet is certain.

BOLINGBROKE, *bol'ing brook*, HENRY SAINT JOHN, VISCOUNT (1678-1751), an English statesman who is known in history as a clever and versatile but unscrupulous schemer. In 1701 he obtained a seat in the House of Commons, attaching himself to the Tories, but in 1712 he was called to the House of Lords with the title of Viscount Bolingbroke, and in the following year he concluded the Peace of Utrecht. Queen Anne made Bolingbroke Prime Minister, but she died a few days later, and Bolingbroke, dismissed by King George, fled to France to escape the inevitable impeachment which he knew would be the result of the Peace of Utrecht. James Stuart the Pretender, invited him to Lorraine and made him his secretary of state, but dismissed him in 1716, on a suspicion of treachery. In 1723 he was permitted to return to England. Bolingbroke withdrew entirely from politics, spent several years at Battersea and finally returned to France. Pope was indebted to him for suggestions for his *Essay on Man*.

BOLIVAR, SIMON (1783-1830), a leader in the South American struggle for independence, called the "South-American Washington." He studied law in Madrid, returned to South America in 1809 and in the following year took part in a revolutionary rising in Caracas. In the struggles of New Granada, Venezuela, Bolivia and Peru for freedom from Spanish rule, he was the most prominent man, and when in 1819 New Granada and Venezuela were consolidated into a republic under the name of Colombia, Bolivar was made president. In 1823 he became dictator of Peru, but he held the office only two years. The constitution of Bolivia, which he framed, excited in the minds of his enemies the fear that he wished to make himself perpetual dictator over Colombia, Peru and Bolivia, and he lost some of his influence. The presidency of Colombia he held until a few months before his death. Perhaps no other South American has been honored with a greater number of monuments.



BOLIVIA, *boliv'ia*, the larger of the only two countries in South America which have no seacoast, the other being its southeastern neighbor, Paraguay. Because of its comparative isolation it has not advanced commercially as rapidly as its resources have made possible, but from another viewpoint its location will prove fortunate in the future. It touches the boundaries of the three greatest South American countries—Brazil, Argentina and Chile—and their present rapid development is reaching across the borders and giving fresh impetus to the shut-in country.

Bolivia is 950 miles long, practically the distance from New York City to Chicago; its greatest width is 800 miles. The area of the country is 514,465 square miles, but there were only 1,744,568 people in 1900, fewer than four to the square mile. There has not been a more recent census; previous to 1900 there had not been a census since 1854. The estimated population in 1932 was 3,078,000.

The People and Their Languages. The inhabitants include whites and Indians, the latter constituting over half of the population. The whites are mostly Spaniards and their descendants. The Indians are divided between two nationalities, the Quichuas and the Aymaras. The latter are descendants from the Incas, who occupied the territory previous to the Spanish conquest, and live in the high plains to the east of the mountains, where they are engaged in agriculture and in raising live stock. The Quichuas are employed in working the mines and as domestic servants, and some engage in tilling the land. The whites hold all public offices of importance and fill the leading professional and commercial positions. Most of the small tradesmen are known as Mestizos, and are persons of mixed Indian and white blood. Spanish is the prevailing language, but the Indians maintain their native tongue. Nearly all the people are Roman Catholics.

The only large town is La Paz (150,000), and it is described elsewhere. Sucre, the capital, has 26,000 people. Other towns are Cochabamba (49,000), and Potosi (36,000).

Education. Theoretically the government provides a system of public schools and makes education compulsory, but the laws are not enforced. The schools are yet inadequate to the demands and are generally of poor quality, and a large proportion of the population is illiterate. About 2,000 elementary schools are maintained. A few high schools and industrial schools exist, and there are twenty-nine universities and colleges in the country. Schools for the Indian children are also maintained by missions of the various churches. Only about 35 out of every 100 of the adult Indian population are able to read and write.

Transportation. There is one main railroad in Bolivia. It enters the country from Cuzco, Peru, passes through La Paz and Oruro, and extends southwest to Antofagasta, Chile, on the Atlantic. Branches reach to Cochabamba and into Northern Argentina. Country roads are few and poor, and those in the mountains are for pack animals only. Commerce would receive a strong impetus if Bolivia could acquire a seaport on the Atlantic, only a few miles distant from its western boundary. Negotiations with Chile to cede a strip of land reaching to the sea have met with defeat.

Surface and Drainage. The western part of the country is traversed by two parallel ranges of the Andes, which extend from the northwest to the southeast. Of these the eastern range is much the higher, and it contains several peaks exceeding 20,000 feet in altitude. Among the peaks of the western range is the volcano Sajama, which reaches an altitude of 21,000 feet. Between these ranges lies the Bolivian plateau, having an altitude of from 12,000 to 13,000 feet and traversed by a number of small ranges. In this plateau is located Lake Titicaca, which has an elevation of 12,000 feet (see *TITICACA, LAKE OF*). East of the mountains the country consists of a plain which descends by a gradual slope from the foothills to an elevation of about 300 feet at the eastern boundary.

The principal rivers traverse this plain, flowing into the Madeira, which waters the northern, and the Paraguay, which waters the southern, part of the country. The largest of these streams are the Bermejo and the Pilcomayo in the south, and the Bene Itenez and Marmore in the north. All of these are navigable.

Natural Resources. Since its discovery Bolivia has been noted for its mineral wealth. A part of the gold which the Spaniards found in the possession of the Incas was taken from mines of Bolivia, but after the conquest these mines were not worked until the Spaniards enslaved the natives and compelled them to labor. At no time since the conquest has the output of gold and silver been proportional to the richness of the mines. Silver once constituted the most important metallic product; for many years Bolivia ranked fifth among the nations in production of this metal, but now it has fallen to about eighth place.

Only the Malay Peninsula exceeds Bolivia in tin production; this metal is now its chief mining asset. The country is second only to China in the production of antimony. There are indications of vast oil deposits, but development is slow. Next to Brazil, Bolivia is the greatest rubber exporter of any nation on the continent.

Climate. The country has three climatic regions, the warm or semi-tropical region, occupying the lowlands of the east, the temperate region, found in the intermediate altitudes, and the cold region of the mountains and the Bolivian plateau. The rainy season lasts through December, January and February, and during this time rains and hailstorms are of frequent occurrence. The most desirable climatic region is that of the middle latitudes, where the climate is temperate and salubrious. There is in most sections sufficient rainfall for agriculture.

Agriculture. The great plain east of the mountains contains some fertile land; nevertheless, agriculture is almost entirely neglected, and the methods employed in cultivating the soil are of the most primitive sort. The land is owned by the Indians or by wealthy whites who reside in towns. All work is by the natives and is done by hand labor, and because of the inefficient methods the returns are poor. The chief crops are alfalfa, barley, sugar cane, coffee, cacao, potatoes and cereals. Extensive areas are given to grazing, and large herds of llamas, vicuñas, alpacas and sheep, and in some localities horses and cattle, are found. The forests cover large areas.

There are practically no manufactures.

Government. The government is republican in form. The executive power is vested in the President, elected by the people for

four years. He is assisted by a Vice-President, elected in the same way and for the same term, and by seven Ministers. The legislative department consists of a national assembly of two houses, the Senate and the Chamber of Deputies. The Senate is composed of sixteen members, elected for six years, and the Chamber of seventy members, elected for four years. For the purpose of local government the country is divided into eight departments, and each of these is subdivided into provinces and cantons. The courts consist of one Supreme Court and a number of superior and inferior courts. The judges of these are nominated by the Chamber of Deputies and confirmed by the Senate.

History. Bolivia was a part of the ancient empire of the Incas. It was conquered by the Spaniards under Pizarro in 1538. During the following century and a half, the Spaniards subdued and enslaved the natives. In 1780 an Indian uprising occurred, which caused considerable trouble. The country remained under Spanish rule until 1825, when it gained its independence, organized a republican form of government and adopted a constitution proposed by General Bolivar, for whom the country is named. Since that time Bolivia has been harassed by rebellions and revolutions to such an extent as to paralyze its industries and prevent either social or civic development. As a result of the war in which Bolivia and Peru combined against Chile in 1884 Bolivia was compelled to relinquish the portion of its territory bordering on the sea, thereby losing its nitrate.

There has been but one revolution in forty years; in 1898 civil strife for six months resulted in the overthrow of one President and the substitution of another. Beginning in 1930 Bolivia and Paraguay waged war for 10,000 square miles of the Gran Chaco, lying between the two countries. The area is not of great economic value, but thousands of lives were sacrificed during nearly five years. In 1935 both nations accepted arbitration.

BOLL WEEVIL, *bole wee'v'l*, an insect which is very injurious to the cotton plant. Introduced into Texas from Mexico in 1892, it gradually spread northward, and by 1917 had reached the cotton fields of North Carolina. The creature is a small beetle of a grayish color. The female lays its eggs in the cotton bolls (whence the name) and in

punctures of the buds, called squares. When the larvae hatch they stay within the squares or bolls, feeding upon their contents. The cotton fiber of infested bolls is rendered valueless, while a square usually falls to the ground. It is estimated that the cotton crop of the United States is annually diminished about 400,000 bales by this pest, though the government is working energetically to exterminate it. The Department of Agriculture has recommended the following:

The field ought to be cleaned in the fall by uprooting the stalks of the old plant, collecting with them the fallen bolls and burning them. This is a very important step, for it destroys all the insects and larvae that have accumulated there. Then the field ought to be plowed deep in the fall and prepared during the winter for an early crop. This can be done by planting early maturing varieties and by fertilizing when necessary.

BOLOGNA, *bo lo'nyah*, ITALY, an important industrial and educational center, capital of the province of Bologna. It lies in a fertile plain at the base of the Apennines, eighty-three miles north of Florence. Bologna contains many beautiful churches, and has long been renowned for its university, founded as early as 1088, and having a library of over 255,000 volumes and 5,000 manuscripts. The Academy of Fine Arts has a rich collection of paintings by native artists, such as Francia, and those of the later Bolognese school, of which the Carracci, Guido Reni, Domenichino and Albano were the founders. The city has important manufactures of sausages, macaroni, silk goods, velvet, chemicals and paper.

Bologna was founded by the Etruscans under the name of Felsina. It became in 189 B. C. the Roman colony Bononia, passed into the hands of the Franks later and was made a free city by Charlemagne in A. D. 800. In the twelfth and thirteenth centuries it was one of the most flourishing of the Italian republics, but the feuds between the different parties of the nobles led to its submission to the Papal see in 1514. Several attempts were made to throw off the Papal yoke, one of which, in 1831, was for a time successful. In 1849 the Austrians obtained possession of it. In 1860 it was annexed to the dominions of King Victor Emmanuel. Population, 1921, 210,969; in 1931, 246,280.

BOLOGNESE, *bo lo nyeez'*, **SCHOOL OF PAINTING**. See **PAINTING**.

BOLSHEVIKI, *bol shev i ke'*, a party of Russian radicals who gained control of the revolutionary government in November, 1917, and supplanted the government headed by Alexander Kerensky. The name means *majority*, from the Russian word "bolshistvo," and was originally applied to distinguish the extreme wing of the Russian Socialists; within a few years the name Communist was substituted.

The Bolsheviks organized a Cabinet on November 9, with Nikolai Lenine as Premier and Leon Trotzky as Foreign Minister, and soon began negotiations with the Central Powers for the conclusion of peace. Peace was formally recognized by the Treaty of Brest-Litovsk (1918), as a result of which Russia was dismembered, and the provinces along the German frontier became "buffer" states under German influence. "Residue-Russia," as German official statements termed the part left to the Bolsheviks, fell into a chaotic state.

The program of the Bolsheviks included a revolution of the working people of all countries, and the setting up of governments by them. They frankly admit that they are against all classes except the working people; and the disorders in Russia under their rule were due to their adherence to this principle, and the opposition which this principle called forth from the other classes. When the victorious allies forced Germany to sign armistice terms late in 1918, a revolution took place in Germany suspected to have been similar to the one in Russia. It was apparent that the principles of the Bolsheviks had penetrated into German thought, and there were indications that the country might suffer from the same disturbances as those in Russia. Furthermore, a revolutionary spirit seemed to be sweeping over Europe; it was the direct threat of Russian interference in the government of Italy that gave strength to the Fascist uprising under Mussolini in 1922.

In the United States early in 1919 there were abortive attempts of those who dreamed and agitated for the establishment of local soviets in the large cities. Among those carrying on these agitations were many who were subjects of European Powers, and a large number of them Russians, with the result that many arrests were made and deportations of those whom this country had a right to deport under its laws followed.

Bolshevism — A Social Experiment. Usually, as a result of war, new ideals and theories are advanced; old concepts are broken down, leaving room for new ideals and experiments. Bolshevism found many circumstances in Russia favorable to its taking root there. One was the simple form of government, the soviet existing even under the czar, which had points of resemblance to a New England town meeting. It found also among the people, credulity, illiteracy, simplicity of character, and a profound sense of injustice resulting from oppression.

To gain the support of the peasantry, the Bolsheviks met the promise of land distribution, which the Kerensky government failed to carry out, and in that way gained the complete adherence of the vast majority of the Russian population.

Bolshevism asserts that the people who work with their hands shall rule and that the people who work with their brains shall not form a favored class, because of that advantage. A vast educational program has nevertheless been established.

Private property has been largely abolished: The Soviet Government owns and controls the factories, the mines, the railroads, the banks, and directs all means of production and distribution.

While private trade is in a measure still allowed, the Government aims eventually to eliminate all private commerce. It has an absolute monopoly on all foreign trade covering exports and imports.

BOLTON, *bolé'ton*, or **BOLTON - LE-MOORS**, ENGLAND, a manufacturing town of Lancashire, ten miles northwest of Manchester, on the River Croal. It is an important railroad center, and one of the chief cities of England in the production of cotton goods, which industry has continued there without interruption since the reign of Henry VIII. Today its cotton mills are among the largest in the world. Formerly the city was nearly as well known for the manufacture of woolens. It was the home of Arkwright, whose inventions were so important to the spinning industry. There are foundries, engineering and chemical works, and collieries. Population, 1931, 177,250.

BOMB, *bom* or *hum*, a large, hollow iron ball or shell, filled with explosive material designed to cause death. The charge in the bomb is exploded by means of a fuse filled with powder and other inflammable mate-

rials, and ignited by violent contact or by clockwork arrangement. A piece of tubular gas pipe filled with explosives and fitted with a percussion cap forms a destructive form of bomb sometimes used by gangsters and rioters. Bombs called *grenades*, which are thrown by hand, were extensively used in the World War.

BOMBARDIER, *bom bur deer'*, **BEETLE**, a small ground beetle which has a remarkable power of discharging at its pursuers an offensive secretion, which burns and leaves a stain like nitric acid.

BOMBARDMENT, an attack on a fort, city or other field position by continued fire from big guns. Before the World War bombardment of positions having strong fortifications was as costly to the besiegers as to the defenders, but the great European struggle changed all preconceived ideas of the effects of such attacks. In their drive through Belgium early in 1914 the Germans quickly demolished the supposed impregnable forts before Liége and Antwerp, using guns of power hitherto unknown. Artillery bombardment assumed a highly important place as the war progressed, for it was found that the strongest trenches, dugouts, wire entanglements, etc., could be wiped out by prolonged and concentrated gunfire.

BOMBAY, *bom ba'*, one of three great divisions of British India which politically are called presidencies, the others being Madras and Bengal. In previous years a presidency, in this sense, was a province whose executive authority was entrusted to a council presided over by the governor, who was known as its president. This is no longer true. Under the India Bill (1935) practical autonomy is given to the presidencies and provinces of India, with governors, as the king's representatives, given powers of veto and rule by ordinance, to be used only in case of necessity.

The Bombay presidency formerly included Sind and the Aden protectorate, but under the India Bill Sind became a province of its own, and control of the Aden Protectorate became vested in the British Minister for the Colonies. The presidency, under this scheme, therefore is bounded on the north by Sind, the Punjab and Rajputana; on the east by the Central Provinces and Berar; on the west by the Arabian Sea, and on the south by the Madras presidency and Mysore state. It comprises an area of

146,500 square miles. Along a thousand miles of its length is a mountain range (highest peak, 8000 ft.), which breaks up the rain-clouds passing from across the Arabian Sea and irrigates the tract between the mountains and sea, making them immensely fertile, while the tract to the east of the mountains (called the Western Ghats) is arid and infertile.

The climate of Bombay is hot. The capital city, also named Bombay (which see) is in the same latitude as the Hawaiian Islands, Mexico City and Southern Cuba, but none of these sections is so warm as most parts of the presidency. A temperature of 125° is not unusual, and for weeks at a time 95° in the shade is common. There are four main physical divisions: The northern part, called the Sindh, has a low, generally unproductive surface; south of this is a section of well-watered, highly-productive country; there is a western mountainous region, traversed by the Ghats, and in the south is the plateau of the Deccan, where rainfall is slight.

That part of the province which is fertile is under intensive cultivation; at least three-fourths of the people are engaged in agricultural pursuits. There is considerable wheat on the uplands, vast quantities of rice and cotton, and a fair yield of spices. Except building-stone, salt and bauxite, there is no mineral production. Practically two-thirds of the cotton spindles in India are found in the presidency, to which, with silk, manufactures are practically limited. There is also trade in millet, wheat, rice, oil-seeds, carpets and brass, while there are many minor avenues of investment and enterprise.

In 1931 the population of the presidency was 30,726,510. About ten out of twelve of the natives are illiterate, though the British are remedying this defect as rapidly as possible. Educational progress is slow, because of the dense population and the poverty of the masses. The fine capital, Bombay, has over a million people; Ahmedabad has 274,007; Poona, 214,796; Karachi, 216,883; Surat, 117,434. No other city has 100,000 people. There are four main languages among the natives, and a number of dialects. See INDIA.

BOMBAY', one of India's finest cities, the capital of the British presidency of Bombay (see above). The name is from the Portuguese, and means *good harbor*. It is the chief

seaport on the western coast of British India, and has two water fronts, for the city proper occupies an island twenty-two square miles in extent. It is one of the finest ports in the world. Causeways connect the island with the mainland, so there is practically within one municipality a vast industrial and residence area.

Bombay and Calcutta, at opposite sides of the peninsula, are commercial rivals. The map explains in what respects each excels. Bombay, hundreds of miles nearer Europe, leads in foreign commerce; Calcutta leads in coasting trade and is a larger center of distribution.

The commercial centre of Bombay has grown round the old fort and has many notable buildings, including the Museum, courts of justice, cathedral, railway termini, and Government House at Malabar Hill. The city has one of the world's finest railroad terminal stations, and is itself served between the fort and the suburbs with a network of electric trains. There is a government dockyard covering 200 acres, and miles of docks and shipyards, including the new Ballard pier, from which all European mail steamers sail.

The business section reminds one of a European city; in size and modern appointments only Calcutta among India's cities possesses as fine structures. There is a Chamber of Commerce, a great library, English and native theaters, a medical college and well-equipped hospitals. In this city people of all nationalities meet; in few other places is there such a mingling of Bengalis, Afghans, Sikhs, Rajputs, Chinese, Japanese, Malays, negroes, Siamese, Singhalese, Parsees, Tibetans and Europeans. The Parsees (which see) comprise the smallest section of the native population, but they are the most influential.

The manufactures of Bombay are principally cotton products; the city is a great exporter of cotton and cotton goods. In addition to this industry there are manufactures of pottery, brass utensils and carved woods; the tanning and dyeing interests are important.

Along the coast the average temperature is 79°, and the rainfall is about seventy-five inches a year. Therefore Bombay suffers less from excessive heat than does the Bombay presidency as a whole. The population in 1931 was 1,157,871.

BOMBAZINE, *bom ba zeen'*, a mixed tissue of silk and worsted, the first forming the warp, and the second the weft. It is fine and light in the make, and may be of any color, though black is most in use. Since 1816 it has been manufactured extensively in Norwich, England. In America bombazine was once used widely as a mourning fabric, but its popularity has declined.

BONA FIDE, *bo'nah fide*, a Latin term which is used in law in the sense of honesty or without deception. It means, literally, *in good faith*. The term is used in connection with contracts, purchases, sales and other legal transactions.

BONAN'ZA (Spanish for *fair weather* or *favoring wind*), is a term applied in mining districts of the United States to an abundance of precious metal or rich ore in a mine. The Comstock Lode in Nevada was the first mine to receive the appellation. The term is now also applied to any good fortune or successful enterprise.

BONAPARTE, *bo'na pahrt*, the French form which the great Napoleon was the first to give to the original Italian name *Buonaparte*, borne by his family in Corsica. As early as the twelfth and thirteenth centuries there were in Northern Italy families of this name, members of which received some distinction as governors of cities or envoys. The connection between the Corsican Bonapartes and these Italian families is not clearly established, though probably the former were descended from a Genoese branch of the family, which transplanted itself about the beginning of the sixteenth century to Corsica, an island then under the jurisdiction of Genoa. From that time the Bonapartes ranked as a distinguished patrician family of Ajaccio. About the middle of the eighteenth century there remained three male representatives of this family at Ajaccio, the Archdeacon Lucien Bonaparte, his brother Napoleon and the nephew of both, Carlo, the father of the emperor Napoleon I.

Carlo or Charles Bonaparte (1746-1785) studied law at Pisa University, and on his return to Corsica, married Letizia Ramolino. He fought under Paoli for the independence of Corsica, but when further resistance was useless he went over to the side of the French and was included by Louis XV among the Corsican families who were to have rights in France of nobility. In 1777 he went to Paris, where he resided for several years, procuring

free admission for his second son Napoleon to the military school of Brienne. He died at Montpellier. By his marriage with Letizia Ramolino he left eight children.

Jerome Bonaparte (1784-1860), youngest brother of Napoleon I, was born at Ajaccio. He was educated in the college of Juilly, and afterward became a naval lieutenant. He was sent out on an expedition to the West Indies, but the vessel, being chased by English cruisers, was obliged to put in to New York. During his sojourn in America Jerome Bonaparte became acquainted with Elizabeth Patterson and married her in spite of the protests of his brother. Two years later he separated from her at Napoleon's command, but a son born to the couple founded an American line of Bonapartes. After considerable service, both in the army and navy, Jerome was created king of Westphalia in 1807 and was forced to marry Catherine, Princess of Württemberg.

His government was not wise or prudent, and his extravagance and his brother's increasing exactions nearly brought the state to financial ruin. The Battle of Leipzig put an end to Jerome's reign, and he was obliged to take flight to Paris. He remained faithful to his brother through all the events that followed till the final overthrow at Waterloo. After that, he resided in different cities of Europe but latterly chiefly at Florence. In 1848 he was made a marshal of France and president of the Senate. Of Jerome Bonaparte's second marriage two children remained, Prince Napoleon Joseph, who assumed the name of Jerome, and the Princess Mathilde.

Joseph Bonaparte (1768-1844), the eldest brother of Napoleon I, was born in Corsica and was educated in France at the college of Autun. He returned to Corsica, in 1785, studied law, and in 1792 became a member of the new administration of Corsica, under Paoli. In 1793 he emigrated to Marseilles and married the daughter of a wealthy banker there; and later, with the rise of his brother to fame after the brilliant campaign of Italy, Joseph began a varied diplomatic and military career. At length, in 1806, Napoleon made him king of Naples, and two years afterward transferred him to Madrid as king of Spain. His position there, entirely dependent on the support of French armies, became almost intolerable; he was twice driven from his capital by the approach

of hostile armies, and the third time, in 1813, he fled, not to return. After the Battle of Waterloo he went to the United States and lived for a time near Philadelphia, assuming the title of Count of Survilliers. He subsequently went to England, and from there to Italy, where he died.

Louis Bonaparte (1778-1846), second younger brother of the emperor Napoleon I, and father of Napoleon III, was born in Corsica. He was educated in the artillery school at Chalons, accompanied Napoleon to Italy and Egypt and subsequently rose to the rank of a brigadier-general. In 1802 he married Hortense Beauharnais, Napoleon's step-daughter, and four years later, in 1806, was compelled by his brother to accept the Dutch crown. He exerted himself in promoting the welfare of his new subjects and resisted as far as possible the tyrannical interference and arbitrary procedure of France; but he abdicated in 1810. From this time on he lived chiefly in Rome and in Florence. He died at Leghorn.

Lucien Bonaparte (1775-1840), Prince of Canino, next younger brother of Napoleon I, was born at Ajaccio. He emigrated in 1793 to Marseilles, where he distinguished himself as a republican orator and politician. After receiving an appointment in the commissariat at Saint Maximin, he married Christine Boyer, the daughter of an innkeeper there. After Robespierre's fall he was in some danger, but his brother's influence operated in his favor, and by 1798 he was settled in Paris and a member of the newly elected Council of Five Hundred. Shortly after Napoleon's return from Egypt, Lucien was elected president of the Council, and in this position he contributed greatly to the fall of the Directory and the establishment of his brother's power. In the next year he fell into disfavor and was sent out of the way as ambassador to Spain. Eventually, when Napoleon had the consulate declared hereditary, Lucien withdrew to Italy, settling finally at Rome, where he devoted himself to the arts and sciences and lived in apparent indifference to the growth of his brother's power. He came to France, however, and exerted himself on his brother's behalf, both before and after the Battle of Waterloo. Returning to Italy, he spent the rest of his life in literary and scientific researches. Pope Pius VII made him Prince of Canino.

Napoleon Bonaparte. See NAPOLEON I.

Charles Joseph Bonaparte (1851-1921) was the son of Jerome Bonaparte and Elizabeth Patterson. He was graduated from Harvard University and the school of law, and later attained distinction as a lawyer. In 1905 President Roosevelt made him Secretary of the Navy and from 1906 to 1909 he was Attorney-General.

BONAR LAW. See LAW, ANDREW BONAR.

BOND, an obligation in writing to pay a sum of money, or to do or not to do some particular thing specified in the bond. The person who gives the bond is called the *obligor*; the persons receiving the bond is called the *obligee*. No person who cannot legally enter into a contract can become an obligor, though such a person may become an obligee. No particular form of words is essential to the validity of a bond. Bonds are of two classes: they are *simple*, where a simple promise is made; *conditional*, where a promise is made to be fulfilled in a case a certain other condition is not fulfilled.

Bonds as Notes. A common form of bond is that on which money is loaned to a company or corporation, and by which the borrower is bound to pay the lender a certain rate of interest for the money. A private corporation, a city, a state or a nation may be in need of a large sum of money. This it secures by issuing bonds and selling them to investors. A bond simply says that the issuing authority promises to pay the face value of the bond, on a definite date, besides a fixed rate of interest each year until maturity. Bonds may run for any length of time, but in ordinary practice longer than twenty or thirty years is unusual. Though bonds were formerly issued only in large denominations, \$500 and \$1,000, a growing demand for those which would appeal to the small investor has gradually led to the issue of smaller denominations, usually \$100. New York City at one time issued bonds in denominations of \$10. Bonds for small amounts are known among brokers as "baby bonds."

There are two kinds of bonds, *mortgage bonds* and *debenture bonds*. A mortgage bond is, as the name implies, a direct lien on the company's assets, or on some special part of the assets designated in the bond. For example, a railroad will issue bonds which are a lien on one of its subsidiaries or on one of its divisions. A *debenture* bond is a promise, under seal, to pay a certain amount. It is merely the note of the corporation, without

the characteristics of a mortgage. Debenture bonds are usually payable in a few years, whereas mortgage bonds run for a longer period.

In all cases, bonds are the primary obligation of a corporation. No dividends can be paid on either preferred or common stock until the interest on the bonds has been paid. If the interest is not paid it is said to be *defaulted*.

Registered and Coupon Bonds. Bond advertisements frequently state that "these bonds are sold with the privilege of registry." The owner's name, the serial number of the bonds and the amount are then registered on the company's books. Registered bonds may be transferred by giving proper notice to the secretary of the company, who makes the necessary changes in the book known as the *register*. *Coupon bonds* have certificates of interest, or *coupons*, attached, which state the amount of interest due. These coupons are to be cut off when the interest date arrives and are presented for payment. Usually any bank, on receipt of the coupons, will pay the interest to its customers and will in turn collect from the corporation or governmental unit which issued the bonds.

Government Bonds. Bonds issued by a national government are not protected by mortgages, as no citizen can sue a nation for debt. The investor in a government bond loans his money in the belief that if the government survives his investment is safe, for back of the loan are the entire resources and the good faith of the nation. So confident of ample security are capitalists that on several occasions governments have floated loans in peace times at two and two and one-half per cent interest. During the World War, when loans of stupendous amounts were needed, the interest rates were higher. See **LIBERTY BONDS**.

Popularity. In prosperous times bonds are desirable purchases, but depression periods may impair or destroy their value. It is impossible to forestall the future with respect to the bonds of apparently strong companies; there is always the possibility of loss. In ordinary times investments in bonds are quite secure. This is particularly true respecting those issued by public bodies such as cities and states. Their payment is guaranteed by local systems of taxation. In the case of governmental divisions, taxes would be suddenly raised if long time bonds could

not be sold to meet large necessary expenditures; if a city could not borrow money it would have to raise the required amount by taxation within a year or two, possibly a thing that could not be accomplished.

Bonds are now issued to raise money for almost every conceivable purpose. Street car lines, railroads, telephone and telegraph companies, and many private enterprises, including small manufacturing enterprises and incorporated retail stores, have borrowed money in this way. Public schools, new and improved highways, bridges, canals and irrigation ditches, waterworks, lighting plants, parks, bathing beaches—these are some of the many public improvements whose cost has been met by the issue of bonds. In fact, the expenses of nearly all public improvements are now met by bond issues.

BONE, a hard material constituting the framework of mammals, birds, fishes and reptiles, and protecting vital organs, such as the heart and lungs, from external pressure and injury. Bones are hard on the outside, and are covered with a protecting membrane called *periosteum*. The internal parts of the bone are more cellular, the spaces being filled with marrow, a fatty tissue supporting fine blood vessels. The bones of an adult consist of nearly thirty-four per cent animal material and sixty-six per cent mineral substances, chiefly phosphate and carbonate of lime. The animal material may be shown by placing a bone in weak acid, which will dissolve the mineral matter and leave the bone so that it can be easily bent. The animal matter is destroyed by burning, leaving the bone brittle and easily crushed.

Because the bones of children contain a smaller proportion of mineral matter they are less brittle than those of adults, and are not so easily broken. On the other hand they are more flexible and may become misshapen if attention is not paid to proper sitting and standing positions.

Bones, from the quantity of phosphates they contain make a good fertilizer. The value of bone as such is increased by boiling out the fat and gelatin, the removal of which makes the bones more readily acted on by the weather and hastens their decay; by the distribution of their parts by grinding them to dust, and by dissolving them in sulphuric acid to render the phosphate soluble in water. Before being utilized in agriculture they are often boiled for the oil or fat they

contain, which is used in the manufacture of soap and lubricants.

The bones of the adult body are pictured and named in a full-page illustration accompanying the article *Skeleton*.

BONEBLACK, IVORY BLACK, or ANIMAL CHARCOAL, a substance obtained by heating bones in close retorts till they are reduced to small, coarse grains, after which the charcoal is reduced to powder by crushing between rollers. Boneblack possesses the valuable property of arresting and absorbing into itself the coloring matter of liquids which are passed through it. Hence it is extensively used in the process of sugar refining, in which cylinders of large dimensions filled with this substance are used as filters. After a certain amount of absorption the charcoal becomes saturated and ceases to act. It has then to be restored by reheating or other methods. Boneblack has also the property of absorbing odors, and may thus serve as a disinfectant of clothing and apartments.

BONESET, *bone'set*, or **THOROUGH-WORT**, a useful annual plant, native to America, easily recognized by its tall stem, four or five feet in height, passing through the middle of a large, double, hairy leaf, and surmounted by a broad, flat head of light purple flowers. An infusion of it is much used in domestic medicine as a tonic and for causing perspiration.

BONHEUR, *bo nor'*, MARIE ROSA (1822-1899), a distinguished French artist and painter of animals. In her particular field she has surpassed all other women painters. When only eighteen years old she exhibited two pictures, *Goats and Sheep* and *Two Rabbits*, which gave clear indications of talent. Among her famous canvases are *Plowing in Nivernais*, now in the Louvre; *Haymaking* and *The Horse Fair*, now in the Metropolitan Museum of Art, New York. It was placed there by Cornelius Vanderbilt, who paid \$55,000 for it. In 1865 she was honored by Empress Eugénie, receiving the Cross of the Legion of Honor.

BON HOMME RICHARD, *bo nom' re-shahr'*, the flagship of John Paul Jones in his victory over the English sloop *Serapis*, September 23, 1779. With the aid of the French government, Jones had collected a small fleet, and in cruising about the English coast had captured many prizes. September 23, sighting a British fleet of merchantmen under consort of the *Serapis* and the *Countess of Scar-*

borough, he gave battle. The main contest was between the *Richard* and the *Serapis*, during which Jones lashed the two boats together and precipitated a fearful hand to hand fight. After several hours, the British ship surrendered, but the *Richard* was so badly damaged that it sank. The victory was important in winning foreign respect for the American navy. See JONES, JOHN PAUL.

BONIFACE, the name of nine Popes, of whom only three are conspicuous in history. BONIFACE II (530-532) was the first Pope to assume the title of Universal Bishop of Christendom. BONIFACE VIII (1294-1303), Benedetto Gaetani, born at Anagni, was the greatest Pope of the name. His inauguration was distinguished by unusual pomp and ceremony. In 1296 the Pope issued his famous bull *Clericis Laicos*, in which he forbade the payment or collection of taxes on ecclesiastical property without the consent of the Holy See. In 1300 he instituted the Roman Jubilee, and in 1302 he issued the bull *Unam Sanctam*, proclaiming the subjection of the temporal to the spiritual power to be an article of faith necessary to salvation. BONIFACE IX (1389-1404), a native of Naples, successor to Urban VI, acquired almost absolute power in Rome.

BONIFACE, SAINT (680-755), (original name, Winfrid), a celebrated English missionary, sometimes called the Apostle of Germany, born at Kirtou, Devonshire, of a noble Anglo-Saxon family. He labored among the Frisians and German tribes. In 722 he was made bishop and ten years later archbishop. About 743 he founded the Abbey of Fulda, and for ten years, beginning in 744, he was Archbishop of Mainz. He is said to have enforced his missionary teaching by cutting down, with his own hands, the sacred oak at Geismar. Saint Boniface was murdered by some Barbarians and was buried in the Abbey of Fulda. His festival is celebrated in both the Roman and Anglican churches on June 5th.

BONITO, *bo né'to*, a name applied to several fishes of the mackerel family, one of which, the bonito of the tropics, or *striped bellied tunny*, is well known to voyagers from its persistent pursuit of the flying-fish. It is a beautiful fish, steel blue on the back and sides, silvery on the belly, with four brown longitudinal bands on each side. It grows to a length of two and a half feet and is good eating, though rather dry.

BONN, GERMANY, an important city in Rhenish Prussia, situated on the left bank of the Rhine, about five miles southeast of Cologne. The scenery and surroundings of Bonn are very beautiful and attract tourists from all over the world. The chief buildings are the Münster church, in the late Romanesque style, the Rathaus, the Beethoven House, where the composer was born, and the buildings of the university. Bonn was long the residence of the electors of Cologne and finally passed into the hands of Prussia by the arrangements of the Congress of Vienna in 1815. Population, 1933, 99,000.

The University of Bonn was established in 1818 by Frederick William III, king of Prussia. Next to the University of Berlin, Bonn is considered the leading German university. Its faculties embrace those of theology, law, medicine and philosophy. In 1930 it had a student enrollment of over 5,000. The library contains 360,000 volumes, besides a large number of manuscripts. The medical department embraces laboratories, a physiological institute and clinics. The university also has a celebrated observatory.

BONNET-ROUGE, *bo na'roozh'*, meaning *red cap*, was a headdress worn during the French Revolution by every one who wished to be considered a true patriot. It was regarded as the emblem of liberty, being called the *cap of liberty*. The name was also applied to the Revolutionists themselves.

BONUS, a special monetary payment beyond the agreed amount. In its most common aspect it is a sum of money paid to employes in addition to salaries and wages, as a form of profit sharing (which see). The term also applies to sums allotted to soldiers and sailors beyond the stipulated remuneration. Though not so called, an extra dividend from stock investments is a bonus.

BOOBY, a swimming bird, named from the extraordinary stupidity, or apparent stupidity, which it shows in lighting on ships and allowing itself to be caught. Some say, however, that it is merely slow in moving because of its heavy wings; others insist that it is so seldom in contact with man that it has not learned to fear him. The name is taken from the Spanish word for *idiot*. The booby lives on fish, which it takes by darting down upon them when they are swimming near the surface of the water. Its lower jaw and throat are naked and in one species are colored blue.



BOOK. Books as we know them to-day are a product of the modern period. It was late in the Middle Ages (about 1450) that John Gutenberg perfected his invention of printing from movable types, and revolutionized the whole field of bookmaking. Before his time mankind had used various devices for the preservation of written records.

The Egyptians engraved inscriptions on stones, on the walls of their monuments and on columns; the Assyrians pressed theirs upon tablets, which were hardened by baking; the Greeks and Romans used tablets of ivory, metal or wood. When tablets of wood were used, they were coated with wax on one side and on this wax, letters were traced with a stylus. Two such tablets, joined together at the back with wires, are the earliest arrangement which resembles the modern book. A raised margin was left around the edge of the wooden tablets to prevent the wax from rubbing.

As people became more advanced and felt greater and more constant need of expressing themselves in writing, a more convenient material was found absolutely necessary, and the papyrus plant of the Egyptians furnished the first flexible writing material of any importance. The papyrus was written on with reeds dipped in gum water colored with soot, and various other decoctions which were used as ink are mentioned by ancient writers. The next material employed was a parchment made from the skins of sheep. The pieces of parchment or papyrus were joined together, when a composition of any length was to be set down, and the entire sheet was wound about a stick in the form of a roll. This was called a *volumen*, and from this comes our word *volume*. Many of these rolls of papyrus, most of them in a good state of preservation, have been found in the coffins with embalmed bodies in Egypt.

Paper made from cotton came into use about the end of the ninth century and checked the total destruction of old manuscripts, many of which were being erased that the parchment on which they were written might be used again. As linen paper became common in Europe the first real im-

petus was given to the production of books. The quality of the paper was poor, it was brownish in color and thick and rough, but many of the books produced at this time are marvels of skill and beauty. The writing was all done by hand, and the writers were, for the most part, monks, many of whom spent all of their time in copying. The full story of these interesting productions is told in these volumes in the article MANUSCRIPT.

Modern Bookmaking. After Gutenberg gave his invention to the world reading became much more general, but it was several years before books were cheap enough to circulate among the common people. The first printed books were copies of the Bible and other religious works, but these were soon followed by reproductions and translations of the Greek and Roman classics. Many features of the modern book were lacking, such as the title page, the date of publishing, and the publisher's name. These early books, too, were large and cumbersome, and had leaves of coarse, thick paper.

About the beginning of the sixteenth century books of more convenient size began to circulate, and title pages became common. Pasteboard was used in the binding, thinner paper made its appearance, and though the printing was very faulty, the outside was often beautifully ornamented. In the course of time glazed cloth came into use as a covering for the sides of books. Great advance was made in all phases of bookmaking during the nineteenth century, and printing at last became a real art. A recent development is the use of thin *India paper* for leaves, which permits the issuing of Bibles and long novels like those of Dickens in small, compact volumes. A slightly heavier grade of paper, but one much thinner than ordinary paper, is used by publishers of some encyclopedias, to eliminate the heavy, cumbersome volume formerly in circulation.

The mechanical processes involved in bookmaking are explained elsewhere in these volumes under the headings BOOKBINDING, PAPER, PRINTING and PRINTING PRESS.

The Book Trade in America. The printing business in America prospered from an early period, and it owes much to that sturdy pioneer, Benjamin Franklin. For many years, however, the business was confined principally to the reprinting of imported books, especially those by English authors. With the general development of the country

American books began to be published in increasing numbers, and since 1890 the output has multiplied by leaps and bounds. Popular "sellers" run through many editions, and a publisher may market a million copies of a book that catches the public fancy. In 1910, 13,470 titles of new books were recorded in the United States. That was an unusual year, however. The outbreak of the World War four years later had a depressing effect, reducing the number of titles to 9,734 in 1915. The next year showed an increase to 10,445, chiefly because general interest in the war caused the production of many books relating to the great conflict. It is a notable fact that books of fiction, which predominated prior to 1920, later showed a smaller percentage of the total output, especially during the depression years beginning in 1930. Libraries reported during that period increased demands by readers for works on serious subjects, biography, science, history, mechanics and economics, rivalled any previous period.

The reader will find detailed suggestions on reading in the article Reading.

BOOKBINDING, the art of fastening together the pages of a book and enclosing them in a case, called the cover. The first step in binding a book consists in folding the sheets. In small binderies this is done by hand, but in all of the larger establishments it is done by machinery. The separate sheets are fed into the folding machine either by an operator or by automatic feeders. The folder folds and presses the paper in the order necessary to bring successive pages opposite one another. The next step consists in arranging the folded sheets, called *signatures*, in order to constitute the book. In large binderies sheets of the various signatures are placed together in piles on a large revolving table, the piles being laid in the order of their signature numbers, as 1, 2, 3, and so on. Several girls sit or stand at this table, and as it revolves each one takes a sheet from each pile as it comes opposite her. In this way by one revolution of the table as many books are placed together as there are girls to collect the sheets. If the book is large, two tables are required. This process is called *gathering*.

After being gathered the sheets are pressed together in a strong press, where they remain for some hours. After their removal from this press the packages are ready for

sewing. There are two processes here employed. The common practice is to sew the various signatures together with linen thread through the back, employing an intricate sewing machine. A book thus sewed is a "machine-sewed" book. By the second process, resulting in what is known as a "hand-forwarded" book, each book is creased across by a saw made for the purpose, the books containing from three to five creases, according to its size. Large strong cords or tapes are fastened in these creases, the ends being left three or four inches long. The leaves are sewed to these cords and in this way the book is fastened together.

After sewing by either process, the back is covered with a thick coating of glue and paste. When this is dry, the book is placed in a press resembling a vise, and is hammered to round the back. This press contains boards, over the edge of which the folded edges of the sheets are slightly bent in the hammering, thus forming a ledge in which the cover of the book rests.

The book is now ready for the cover or case. This is put on in two ways. If the book is bound in leather, the boards forming the cover are first fastened to the book. This is done by raveling or scraping the ends of the cords to which the leaves have been sewed and gluing these to the boards, in case of the hand-bound book, or strong cloth is pasted along the back, with a strip projecting to be pasted upon the cover, to fasten book and cover firmly together. The cover is then lined with white or colored paper and whatever lettering is necessary is put upon the cover, then the cover is pasted to the book, and the book is placed in press and allowed to dry. If a cloth cover or case is used, this is made complete before it is fastened upon the book. The method of fastening is practically the same as that used with a leather cover, and the finishing is done in the same way.

The edges of the book are treated in various ways. Before the cover is put on, the books are placed in a cutting machine, where the edges are trimmed. These may be left plain, or they may be sprinkled, by placing them under a sieve over which a brush containing coloring matter is drawn; they may be feathered, by dipping them in a tank of water on the surface of which coloring matter has been spread to form the desired pattern, or they may be gilded, which is done

by treating the edges with a solution of white of egg and water and then laying on gold leaf. When dry, the gold leaf is burnished and furnishes the beautiful gilt appearance which is seen on many high-priced books. Uncut edges are preferred for many books. This usually means that the books are trimmed at the ends, but that the front edge of the leaf is left as it was formed by folding.

Styles of binding are denoted by different names. A *leather-bound* book is one which is wholly covered by leather, as an unabridged dictionary or most law books. A *cloth-bound* book is one that has the sides and back covered with cloth. This style of binding is by far the most common. A *half-leather* has the back and corners of leather and the boards covered with cloth. The head binding is a cord or tape fastened to the ends of the back for the purpose of improving the appearance of the volume. When such an addition is made it is put on before the cover is fastened to the book.

The hand-made books which were produced before the art of printing was invented were very expensive, and the bindings corresponded with the work on the book. The covers were usually of boards, which were often covered with leather that was highly ornamented, and they were also held in place by metallic hinges bearing engraved designs or other ornaments. Metallic clasps of gold and silver were also often used to fasten the book together, and these might contain rich settings of jewels and other gems. But when the art of printing made books cheaper and more readily accessible, the style of binding was changed accordingly, so as to reduce the price of the book. SEE BOOK.

BOOKKEEPING, the science of accounts, or the method by which business transactions are recorded and classified. Not only does careful bookkeeping show daily the condition of each individual account in which a company is interested, but a summary of all accounts shows the actual condition of the business as a whole.

Single-Entry Bookkeeping. Briefly stated, any system which accurately shows the balance between all the debits of a business and all its credits may be called a system of bookkeeping. Such a system is quite simple, but it can be used only for a very small business. Accountants have named such a system *single-entry* bookkeeping.

In single-entry, as the name implies, there

is but one entry for each transaction. If John Jones buys on credit a barrel of flour at \$12, the merchant puts a \$12 debit in John Jones' account; he makes no entry to the account of flour, or merchandise. When the account is paid he merely puts a record of \$12 to the credit of John Jones, and makes no entry in his principal book, the ledger, of the cash received. The person who keeps such a set of books is able only to know whether more money is due to him than he owes to other people. He needs only a *day book*, in which a statement of each transaction is recorded, and a *ledger*, in which all transactions with each person from whom he buys or to whom he sells are brought together, under debit and credit columns. Sometimes a *cash book* is also kept, but this is not essential.

Double-Entry Bookkeeping. Bookkeeping by double-entry gives a much more accurate and complete record of the business. The key to its essential feature is the word *double*, which indicates that every transaction must be entered in two places, in a debit column and a credit column. No matter how large the business nor how many thousand transactions are recorded, the sum of the debit entries always equals the sum of the credit entries; always there is a perfect balance.

The books used are a *day book*, a *journal* and a *ledger*. In the day book, details of every transaction are entered as they occur. These amounts are then transferred to the journal, being entered opposite the names or titles of the ledger accounts which are concerned. That item in the day book which has cost something, or which the trader has received, is put in the debit column, and that which produces something, or with which the trader has parted, is placed in the credit column. For instance, if a person has bought a suit of clothes for \$15 he would credit cash for \$15 and would debit expense \$15.

The various items in the journal are then transferred to the ledger, or *posted*, all accounts of the same nature, as clothing accounts, cash accounts, grocery accounts, being placed together and debited or credited according to their nature, as shown by the journal. Thus, on the page marked *Cash* in the ledger, for the transaction noted above, \$15 will be entered in the credit column; on the page marked *Expense* \$15 will be entered in the debit column.

In a large business the *Cash* account in the ledger contains only totals carried from the *cash book*. Manifestly, since every item must be posted in some form on both the debit and the credit column of the *journal* and must be transferred accordingly to the *ledger*, all the debit items in the *ledger* must equal all the credit items. An examination to determine whether this is true is known as *taking a trial balance*. This, in a general way, will tell whether the entries have been accurately made. Often other books are used in double-entry bookkeeping to afford means of checking particular phases of the business by themselves; such are the *stock book*, *cash book*, *bill book*, *invoice book*, *account sales book*, each one including entries concerning only its particular subject. For instance, the cash book will show the income and outgo of cash and of nothing more, being retained as an absolutely accurate test of this part of the business.

Qualifications of a Bookkeeper. No young man or woman should prepare for a career as a bookkeeper without, first, a thorough course in arithmetic which has made it clear that the candidate has a liking for mathematical calculations. Second, if such qualities do not exist, there must be developed patience, perseverance, orderliness, accuracy. The bookkeeper must keep his books in balance to a cent—even an error of one cent may cause a search continuing for days. The salary of a bookkeeper averages well with other clerical places—is possibly better than most positions which carry no executive authority.

BOOKPLATE, a printed or engraved label, pasted in or on a book to show its ownership. Such labels were used in the last quarter of the fifteenth century, and were usually hand-painted. Albrecht Dürer originated the engraved bookplate and the first dated specimen which we have was designed by him in 1516. The designs on these early bookplates usually consisted of the owner's coat of arms, with allegorical elements added. About a half-century after these first bookplates were known in Germany, bookplates were introduced into England, and it is here that they have been most widely used. The first English designs were copied from the German and contained coats of arms and mottoes. These were succeeded by the Chippendale style, which was lighter and more graceful, and this in turn by a still simpler design,

known as the ribbon and wreath. The first American bookplates came from England and were used by wealthy colonists. Within the last few years much interest has been shown in bookplates, and considerable literature about them has been produced.

BOOKS FOR READING. See **READING**.

BOOKWORM, a grub which feeds on the paste, binding and leaves of books. The grubs of several different beetles come in this class. They seem to prefer old books, and if unchecked will do great damage to valuable volumes. Bookworms can be killed by the fumes of carbon bisulphide.

A person who is excessively fond of reading is often called a "bookworm."

BOOMERANG, a missile used by the Australian aborigines and by some peoples of India. It is made of hard wood, and is of a peculiar curved shape, sometimes resembling a rude and very open V. The boomerang, when thrown as if to hit some object in advance, instead of going directly forward, slowly ascends into the air, whirling round and round to a considerable height, and returns to the position of the thrower. If it hits an object, of course it falls. The Austra-



BOOMERANGS

lians are very dexterous with this weapon, and can make it go in almost any direction, sometimes making it rebound before striking.

The word *boomerang* is commonly applied at the present time to an act or statement which reacts on the originator of it in such a way as greatly to embarrass him.

BOONE, DANIEL (1735-1820), a famous American pioneer, born in Bucks County, Pa. In his youth the family removed to the North Carolina frontier. Boone's education was limited to reading and writing, but he became skilled in woodcraft, and was the peer of any Indian in sagacity and fearlessness. In May, 1769, when he was thirty-four years old, he

led a company of five men into the unknown wilds of Kentucky, built a fort called Boonesboro on the Kentucky River, and thither brought his family and about thirty volunteers. Boone was captured by the Indians and carried to Old Chillicothe on the Miami, where he was adopted by a Shawnee chief. Learning of an intended raid upon Boonesboro, he escaped (June 16) and reached home in four days, having but one meal during his journey. He found his family gone, but helped to repel the attack of the Indians. In 1780 he again brought his family to Kentucky, and he took a prominent part in the history of the territory till its admission to the Union in 1791.

The Battle of "Blue Licks," in which Boone's sons fought by his side, took place in 1782. In the first survey of the state the title to Boone's land was disputed, and in 1797 he moved to Missouri, then a Spanish province. There he received a grant of 8,000 acres of land. At the time of the Louisiana Purchase he again lost his land, but Congress granted him 850 acres. Enoch Boone, his son was the first white male child born in Kentucky.

In 1915, the Daughters of the American Revolution of North Carolina, Tennessee, Kentucky and Virginia completed the marking of a trail extending from Boone's home in North Carolina to Boonesboro, and traversing the four states mentioned.

BOONE, IA., in Boone County, in the center of the state, is fifty miles northwest of Des Moines, on the Chicago & North Western, the Chicago, Milwaukee, Saint Paul & Pacific and the Fort Dodge, Des Moines & Southern railroads, the latter an interurban line. There are also manufactures of brick and tile, cement blocks, concrete tile machines, hosiery and hardware specialties. In the vicinity there is considerable coal mining. Boone is the division headquarters of the first and third railroads named above and railroad shops of both roads are here. There are three parks, comprising more than 200 acres, a library, and a hospital. Population, 1920, 12,451; in 1930, 11,886.

BOOTH, the family name of two brothers who have a prominent place in American annals, one as a leading tragedian, and one as the assassin of Lincoln.

Edwin Thomas Booth (1833-1893) was the son of the English actor, Junius Brutus Booth (1796-1852). He was born at Belair, Md., and made his first stage appearance at

Boston in 1849. In his numerous tours in the United States and in Europe he was most enthusiastically received. He was particularly famous for his personation of Shakespearean characters—Othello, Richard III, Lear and Hamlet. Booth was of unimposing appearance, but was dignified and graceful, and he possessed a voice singularly flexible and capable of expressing any shade of meaning or feeling.

John Wilkes Booth (1839-1865), the younger brother of the great actor, inherited from his father a touch of insanity that rendered him erratic. During the Civil War his sympathies were for negro slavery, and early in 1865 he formed a conspiracy with others to murder President Lincoln and the principal officers of the government. On the evening of April 14, 1865, he entered Ford's Theater, in Washington, where the President was sitting in a private box, and shot him. Shouting "*Sic semper tyrannis*," ("Thus be it ever to tyrants"), he leaped to the stage below, breaking his leg in the effort, and in the confusion escaped through a back door. Mounting a horse that was held in waiting, he fled to Virginia. Here he was concealed for a time by sympathizers; but, on being discovered in a barn, he refused to surrender and was shot.

BOOTH, a family which has been prominent in religious and social work throughout the world.

William Booth (1829-1912), the founder of the Salvation Army, is the most famous of the Booth family. He was born at Nottingham, England, and was reared in the Episcopal Church, but after being converted in a Wesleyan chapel, he joined the Methodist Church and became a minister of that denomination. He was appointed to hold special evangelistic services in connection with his other work until 1861, when, being requested to settle in the ordinary circuit work, he resigned and began his career as an evangelist proper. In 1855 he married Miss Catherine Mumford, who proved an able helper until her death in 1890.

General Booth organized in London (1865) "The Christian Mission," which grew into the military organization rechristened in 1878 the *Salvation Army*. Under this name that useful organization has spread into many parts of the world and is widely known for the zeal and self-denial of its rank and file (see *SALVATION ARMY*). General Booth

has published many hymns for the use of the Army, and it has gone forth "singing itself around the world." In *Darkest England*, published in 1890, General Booth outlined his plans for the suppression of poverty and vice. His sons and daughters were trained in the work and were associated with him in the Army. His son Bramwell succeeded him as its general. He died in 1929.

Ballington Booth (1859-), the second son of General Booth, is known especially as the founder of the Volunteers of America (which see). He was born and reared in England, and from 1885 to 1887 had command of the Salvation Army in Australia. In 1886 he married Maud Charlesworth, and the following year he and his wife went to America to take charge of the Salvation Army in the United States and Canada. As they were unable to work in harmony with General Booth, they organized in 1896 the Volunteers of America, a society similar to the Salvation Army, but with a more democratic plan of organization. Ballington Booth is a writer and speaker of ability, and is the author of *From Ocean to Ocean*.

Evangeline Cory Booth, seventh child of the founder of the Salvation Army, was born and educated in London. She followed other illustrious members of the family into the work of the Army. For five years she had charge of its affairs in London; then for nine years was Army commissioner (commander) in Canada, and from 1904 to 1934 was in command of the work in the United States. During the World War she directed the vast activities of the Army on the various war fronts, and received the Distinguished Service Medal. In 1934, on the retirement of General Edward J. Higgins, the supreme command passed to her.

Frederick Saint George de Latour Booth-Tucker (1853-) was the immediate successor of Ballington Booth as leader of the American Branch of the Salvation Army. He was born in Bengal, India, and held civil service positions in the Punjab before 1881, when he resigned to join the Salvation Army. The following year he established the Army work in India, and in 1891 became foreign secretary of the Army headquarters in London. He married Emma Ross Booth, a daughter of the General, in 1888, and since then has used the name Booth-Tucker. When Ballington and Maud Booth seceded from the Salvation Army he took up their work in

America, serving until 1904. In that year he returned to London, and in 1907 was appointed special commissioner for India and Ceylon. He wrote *Life of General William Booth* and *Life of Catherine Booth*.

BOOTS AND SHOES, coverings for the feet, in nearly all parts of the world made of leather. The term *shoe* applies to a covering for the foot alone; a *boot* covers the foot and lower leg. In some sections, as in Holland, where styles have remained unchanged for 300 years, wooden shoes are yet much worn, and in China hundreds of millions of people wear shoes of wood and cloth, sometimes expensively ornamented with needlework.

The present-day comfortable pair of boots or shoes represents a gradual development from simple, crude forms. The sandal is the simplest and oldest form of foot protector. It consists of a sole, attached to the foot by a leather thong. Uncivilized races made a shoe of a single piece of untanned hide, which was laced with a thong. From these simple styles more elaborate patterns were developed. The Egyptians, Greeks and Romans were familiar with the boot, and highly ornamented designs were often used by the royalty and nobility. Elaborate designs were also common in England during the fourteenth and fifteenth centuries. Those worn by the nobility became so fantastic and expensive that their styles were at one time regulated by the government.

Manufacture. For centuries all shoes were made by hand, and shoemakers came to America with the first colonists. For a long time in New England the shoemaker traveled from family to family and made shoes from such leather as each family had in its possession. When the country became more thickly settled, the shoemaker located in a small shop, and his customers came to him. The man who could make a pair of boots or shoes in a day was considered a first-class workman. The shoemakers then began to employ apprentices. After a time several makers combined their forces and set some workmen to cutting out the pieces for the shoes, others to sewing these together, others to fastening the uppers to the soles. It was found by this division of labor that more work could be accomplished and in a much more satisfactory manner. Factories were established before any machinery for the manufacture of shoes had been invented.

The first successful machine used in the

manufacture of boots and shoes was the rolling machine, which took the place of the old lapstone and hammer for pressing the leather together and giving it a smooth, hard surface. This was followed by a sewing machine, which first sewed together the various parts forming the upper of the shoe. Pegging machines for fastening the soles to the uppers followed. These were of various patterns, first using pegs, then nails and later wire, for sewing, until the present welt machine was invented, which fastens the uppers to the sole in the present fashion.

Division of Labor. In no other industry is the division of labor more perfect than in the manufacture of boots and shoes. The ordinary shoe factory consists of three departments. The first is that in which the patterns or pieces are cut, this being done in some large factories by machinery, though by hand in many others. Next is the department in which the uppers are sewed together. This consists of a room containing a number of sewing machines arranged in line along a table or bench. Each machine does only one thing; one sews a certain seam and another makes button-holes. Thus the pieces pass on from machine to machine, until they pass from the other end of the table ready to be fastened to the sole. The third department is that where the soles are made and the soles and uppers are fastened together. The soles are cut by machinery and are shaped by being placed in heavy presses. The inner sole is then tacked to a *last*, over which the uppers are drawn and fastened to the sole. The outer sole is then tacked on, the last is removed and the shoe is sewed together on the sewing machine. After this the heel is put on by a machine that presses it into place and fastens it at the same time. The shoes are then sent to the polishing room, where they are finished, and the buttons are put on or the laces put in, as the case may require. They are then packed ready for shipment. The Canadian boot and shoe industry has developed rapidly in recent years. It employs over 14,000 people, and produces over 15,000,000 pairs of boots and shoes annually.

The New England states lead in the manufacture of boots and shoes, but large factories are found in New York, Pennsylvania, Missouri, Illinois and other states. The entire output of the country exceeds 300,000,000 pairs each year in peace times. American shoes are extensively exported to Europe.

BORACIC, *bo ras' ik*, **ACID**. SEE BORIC ACID.

BORAGE, *bur'aj*, a genus of plants having rough, hairy foliage and blue, drooping flowers. One species, a common plant, grows abundantly in waste places in the United States. It is used to give a coolness to beverages, in which its leaves are steeped, and was formerly thought to have the power of driving away care and making people happy. It belongs to the same family as the forget-me-not and bluebell.

BORAH, WILLIAM EDGAR (1865–), United States Senator from Idaho for six consecutive terms ending in 1943. He was born in Illinois, was graduated at the University of Kansas, was admitted to the Kansas bar in 1889, and in 1891 settled in Boise, Idaho. Ten years later he lacked four votes of election by the legislature as Senator; in 1907 he was successful, and went to Washington as a Republican. Through seniority and ability he rose to the chairmanship of the powerful Foreign Relations Committee, which post he surrendered when in 1933 the Senate became strongly Democratic. Borah often disagreed with his associates on party policies, and he became notable for independence of action. He favored the election of Hoover for President in 1928, announced his preference for Roosevelt in 1932, but later in the Senate opposed many of the latter's policies including the proposal to reorganize the Supreme Court.

BORAX, *boh'r ax*, is baborate of sodium. Pure borax forms large, transparent, six-sided prisms, which dissolve readily in water, give off water in dry air, and when heated melt in their water of crystallization, swell up and finally fuse to a transparent glass. Native borax has long been obtained, under the name of *tincal*, from India, the main source being a series of lakes in Tibet. As imported it is in small pieces of a dirty yellowish color and is covered with a fatty or soapy matter. Tincal, which contains various impurities, was formerly the only form in which borax was found, but other sources of borax, particularly in North and South America and in Germany, have been rendered available. Large quantities are manufactured from boric acid obtained in Tuscany, Italy (see BORIC ACID). America yields large quantities, there being rich deposits of borax and boracic minerals on the Pacific slope, especially in Death Valley.

Borax has a variety of uses. In medicine it is employed in ulcerations and skin diseases. It has valuable antiseptic and disinfecting properties, and it is now much used for the preservation of meat, fish and milk. In the laundry it is used to soften water, and various laundry soaps and powders contain it. It is also employed in soldering metals, in making fine glaze for porcelain, as it renders the materials more easily melted, in enameling and in making beads, glass and cement.

BORDEAUX, also known as claret, is a sour, red wine. It is one of the still wines, because it lacks effervescence. The name was derived from Bordeaux, France, where it originated. California produces a fine quality.

BORDEAUX, *bawr doh'*, FRANCE, capital of the department of Gironde, and an important commercial city. As the center of the wine export trade in France, Bordeaux has long been famous. Shipbuilding is also an industry of first importance, and the city in peace times sends large fishing fleets to the Newfoundland Grand Banks. Bordeaux is situated on the Garonne, about seventy miles from the sea and 358 miles southwest of Paris.

By the marriage of Eleanor, daughter of the last Duke of Aquitaine, to Henry II of England, Bordeaux was transferred to the English crown, but under Charles VII, in 1451, it was restored again to France. Population, 1931, 262,990.

BORDEN, ROBERT LAIRD, SIR (1854–1937), a Canadian statesman, leader of the Conservative party, and Premier of Canada throughout the period of the World War. He was born at Grand Pre, Nova Scotia, and educated at Acadia Villa Academy, Horton. Borden was admitted to the bar in 1878 and was the head of the firm of Borden, Ritchie and Chisholm, Halifax, for a number of years. He was elected to the House of Commons for Halifax in 1896 and 1900; in 1904 he was defeated for Halifax but was elected for Carleton, Ontario, after Edward Kidd, member for Carleton, had resigned. At the next general election he was returned for Halifax, which he long represented. From 1901 to 1911 he was leader of the Conservative opposition and following the general election of 1911 he was made Premier, and held this office until 1920. In 1912 Borden was appointed member of the Imperial

Privy Council, and in 1914 the honor of knighthood was bestowed on him.

When England entered the war against Germany the Canadian government pledged its full support to the mother country, and under Premier Borden's leadership the Dominion loyally aided the allied cause. In 1917 Parliament passed a conscription bill which the Laurier Liberals bitterly opposed because it would mean compulsory service for the French-Canadians, who were unwilling to fight for the allies. A general election followed in December, 1917, as a result of which the Borden government was sustained by a decisive majority. Premier Borden was a member of the Imperial War Cabinet in London, in 1917, was a delegate to the Peace Conference in 1919, and represented Canada at the Washington Conference in November, 1921. In 1929 he became head of an insurance company and a bank president.

BORE, a form of tide wave that is seen at spring tide in the estuaries of rivers or in narrow bays. Because of the shape of the estuary the rising waters are piled up as they pass the narrowing shores, and the tide reaches an abnormal height. Bores in the Bay of Fundy sometimes reach a height of sixty feet. The current of a bore is so strong that vessels are often unable to make headway against it. See *TIDES*.

BO'REAS, in classic mythology, one of the six sons of Aeolus, god of the winds. Boreas, who typified the north wind, was shut up in a cave with his five brothers, and only occasionally were they given their freedom. When the gods desired it, or when Aeolus considered that the boys needed exercise, he released them for a period, during which they tore roofs from houses, uprooted trees and piled the sea mountain-high. The name *Boreas* is often used as a symbol for a boisterous north wind. See *AEOLUS*.

BORGHESE, *bawr'ga'ze*, a Roman family, originally of Siena, where it held the highest offices after the middle of the fifteenth century. CAMILLO BORGHESE (1550-1621), who ascended the Papal throne in 1605 as Paul V, was a prominent member of the family. Another CAMILLO BORGHESE (see below) was a brother-in-law of Napoleon.

BORGHESE PALACE, a magnificent building situated in the midst of the grounds of the beautiful villa Borghese just beyond the walls of Rome. Most of the art collec-

tion, consisting of ancient sculpture and painting, belonged originally to the Borghese family of Rome, but was taken to Paris by Napoleon, so that most of the works now contained in the Casino, the name of the building in the villa Borghese, have been gathered together since 1820. The villa and Casino have been purchased by the Italian government and are open to the public. Among the especially noteworthy works of sculpture there are Bernini's *David* and *Apollo and Daphne*. Among the paintings are Domenichino's *Cumaean Sibyl*, Correggio's *Danae*, Titian's *Sacred and Profane Love* and Raphael's *Entombment*, besides masterpieces of many other great painters.

BORGIA, *bor'ja*, the name of an Italian family which came into prominence in the fifteenth century.

Caesar Borgia (1476-1507), son of Rodrigo Borgia, who became Pope as Alexander VI, was a cardinal and military leader. By force and by treachery he gained control of the cities of Romagna and endeavored to form an independent hereditary power in central Italy. He was killed while accompanying the king of Navarre in his war against Castile. Though unscrupulous and cruel, Caesar possessed many redeeming qualities. He was a patron of learning, a brave soldier, a shrewd statesman and an eloquent speaker. Machiavelli holds him up as the type of a model ruler.

Lucretia Borgia (1480-1520), Duchess of Ferrara, and a sister of Caesar Borgia, was a woman of great beauty and intellectual brilliancy, a patron of learning and the arts. In literature her name was long associated with the grossest crimes, but recent researches of accurate and impartial historians have cleared her memory of the worst charges brought against her.

BORGLUM, *bawr'glum*. GUTZON (1871-), an American sculptor whose work represents an admirable blending of technique, vivid imaginative power and idealism. He is a product of the West, for he was born in Idaho and received his public school and college education in Nebraska and Kansas. Borglum studied art in San Francisco and in Paris, and previous to 1902 successfully exhibited examples of his work in sculpture and painting in Paris and London. Since that date he has resided in New York. Representative of his best work are *Mares of Diomedes* in the Metropolitan Museum,

New York; a series of statues in the Cathedral of Saint John the Divine; a bas-relief for the building of the Pan-American Union; and a colossal head of Lincoln in the rotunda of the national Capitol.

Borglum received two very important commissions for colossal sculpturing. In 1915 he was chosen to direct the project of a Confederate Memorial carved on the face of Stone Mountain near Atlanta, Ga. (See **STONE MOUNTAIN**). The other undertaking was the Mt. Rushmore National Memorial in Custer State Park, near Keystone, South Dakota. On the face of this mountain, figures of Washington, Jefferson, Lincoln and Theodore Roosevelt, scaled to the size of men 420 feet tall, are the most distinguishing features. Inscriptions, historical and patriotic, are also carved in the solid Rock. The designs for both memorials were the work of Mr. Borglum. Because of lack of agreement with sponsors, he resigned the commission at Stone Mountain.

BORIC ACID, or **BORACIC**, *bor as'ik*, **ACID**, a compound of the element boron with hydrogen and oxygen. The chief use of the acid is as a source of borax, the baborate of sodium. Boric acid is found as a salty deposit in some volcanic regions, is a part of many minerals and is contained in the steam which, along with sulphurous vapor, issues from cracks in the soil in Tuscany. The steam from these places is now an important source of the acid, a system of condensation and evaporation being employed. The acid forms white, shining, sealy crystals, which, on heating, melt into a transparent mass that when cooled resembles glass. It dissolves in water and has a slight acid taste; it colors blue litmus purple, and yellow turmeric, brown.

BORING MACHINES, machines for piercing wood, leather, metal and rock. The simplest tools for piercing wood are awls, gimlets and augers. The auger used with a brace or bit-stock is usually called a *bit*. The tools used for piercing stone and metals are called drills. The simplest boring machines are operated by hand, either by means of a handle or brace, as in case of the auger, or by driving upon the tool with a hammer, as with a drill; but nearly all boring is now done by machines operated by steam or compressed air. These machines work very rapidly and with great power. The most effective is the diamond drill, used in boring rock. This con-

sists of a hollow tube having black diamond teeth at one end. The drill works with a rotary motion and cuts around a circular piece of rock which forms the core. On account of the hardness of the teeth, the drill will withstand great pressure and sinks into the rock rapidly. See **PNEUMATIC TOOLS**.

BORNEO, *bawr'neo*, the largest island in the East Indian Archipelago, and third in size in the world. The Equator passes through it about midway. It is separated from Indo-China, northwest, and the Philippines, northeast, by the China Sea; from Java, southeast, and Sumatra, southwest, by the Java Sea, and from the Celebes Islands to the east, by Macassar Strait. It has an area of 284,000 square miles, nearly half that of Alaska. The island is not independent. About one-sixth, North Borneo, is owned by Great Britain; nearly a fourth, Sarawak, is ruled by a native sultan, under British control; a small area, Brunei, between North Borneo and Sarawak, once independent, is under British overlords, by treaty. The total area under British sovereignty is about 84,000 square miles; population, exceeding 775,000. The greater part of Borneo, the southern four-sevenths, is a rich colony of The Netherlands, about 206,000 square miles in area; population about 2,200,000.

The island is mountainous and is rich in gold, quicksilver, copper, sulphur, tin and petroleum. An inferior yellow diamond also is found. The highest peak is 13,698 feet above sea-level. There are numerous navigable rivers.

The lowlands, because of the humidity and heat, are unhealthful but fertile, producing cotton, tobacco, spices, sugar cane, potatoes and numerous tropical fruits. Important indigenous trees are the sago palm, valuable as a food producer, and teak and other timber trees. Monkeys and birds abound. The chief beast of burden is a small buffalo. Horses are rare, and only the rich natives and European residents can afford them. The native inhabitants of Borneo are Mohammedan Malays and Bugis, in the southern part, and Sulus, in the northern. The least civilized are the Dyaks (which see), occupying the interior. On and near the rivers and coasts trading and seafaring are the people's chief pursuits, while in the mountains there is considerable mining, done principally by immigrant Chinese, and in the lowlands, extensive farming.

BO'RON, one of the chemical elements, not found native but occurring commonly in combinations, such as borax and sassolite. It was isolated in 1808 in France, and in 1809 in England by Sir Humphry Davy. See BORIC ACID; BORAX.

BOSNA-SERAI, *bos'na sa ri'*. See SARAJEVO.

BOSNIA, *boz'ni a*, until the latter part of 1918 the southernmost province of Austria-Hungary. After the revolution in the dual monarchy, Bosnia and certain other nationalities, in conjunction with the people of the Kingdom of Serbia, declared their independence, and the movement resulted in the formation of the new Serb, Croat and Slovene state. The province, which includes Herzegovina, lies west of Serbia and Montenegro, east of Dalmatia and south of Croatia and Slavonia. It has an area of 19,768 square miles; its population is about 1,900,000. See JUGO-SLAVIA.

Bosnia was a part of the Roman provinces of Dalmatia and Pannonia. The Slavs succeeded the Goths in the sixth century, each small section having its own petty ruler. During the Middle Ages it was possessed in turn by Serbia, Croatia and Hungary. In 1376 Bosnia was proclaimed an independent kingdom, and remained so until 1463, when the Turks conquered it and made it thoroughly Mohammedan in religion. At the close of the Russo-Turkish War of 1877-1878 it became an Austrian protectorate, by decree of the Congress of Berlin, and in 1908 was annexed to Austria-Hungary. For years preceding the World War it was a center of pro-Slavic and anti-Austrian agitation.

Agriculture is the direct support of nearly nine-tenths of the Bosnians. Tobacco, sugar beets, corn, wheat, oats, barley, rye and potatoes are the staple products. Iron, manganese, salt and coal are the leading mineral resources. The language of the Bosnians, called "Bosnisch," is almost identical with the Serbian, and in their manners and customs the people show their relationship to the Serbs. Sarajevo, the chief city and capital, was the scene of the assassination of the heir to the Austrian throne (June 28, 1914), the event which precipitated the World War. In 1931 the city had a population of 78,173.

Related Articles. Consult the following titles for additional information:
Austria-Hungary Sarajevo
Berlin, Congress of World War

BOS'PORUS, a strongly fortified strait connecting the Black Sea with the Sea of Marmora and separating Turkey in Europe from Turkey in Asia. It is nineteen miles long and from one-half to two miles wide. The Strait is an important commercial route and in peace times is frequented by the vessels of all nations. In 1841 the European powers entered into an agreement that no ships of war should pass through it without the consent of Turkey. During the World War the Bosphorus was of great strategic value to the Turks, as it rendered Constantinople safe from attack by water. By the Treaty of Lausanne in 1923, the Bosphorus was internationalized and opened to the trade of all nations.

Over the middle of the channel (about 3,000 feet wide) Darius constructed a bridge of boats on his Scythian expedition (see CONSTANTINOPLE). The *Cimmerian Bosphorus* was the name given by the ancients to the strait that leads from the Black Sea into the Sea of Azov. The Bosphorus of Constantinople is called the Thracian Bosphorus, to distinguish it from the Cimmerian Bosphorus.



The Old State House

BOSTON, MASS., the capital of the state and the county seat of Suffolk County, is the largest city in New England, ninth largest in the United States, and one of the oldest and most interesting municipalities in America. It is popularly called "The Hub," a name which has its origin in a few lines from Holmes's *Autocrat of the Breakfast Table*:

"Boston State House is the hub of the solar system. You couldn't pry that out of a Boston man if you had the tire of all creation straightened out for a crowbar."

Traditionally, Boston is in one very important sense a "hub," for it has long borne the reputation of being the country's center of culture, "the Athens of America," and many arguments can be presented in support of its claim to this title. In a Boston suburb was established the first college planted on American soil—Harvard—and in or near the city Longfellow, Lowell, Holmes, Hawthorne, Emerson, Parkman,

Henry James and many other literary men lived and wrote at some time in their careers. All of the fine arts—literature, music, painting, etc.—have flourished in the friendly atmosphere of this city, and its libraries, schools and museums rank with the best in America.

Situation and Plan. Boston is 232 miles northeast of New York, on a beautiful harbor formed by an indentation of Massachusetts Bay. Two rivers—the Charles and the Mystic—find an outlet in this harbor; the latter bounds the city on the north. The original site of the city was a peninsula of 783 acres, with irregular shores and surrounding marshes, which was joined to the mainland by a tongue of land so low that at times the tide submerged it. In the nineteenth century the inlets, marshes and “Back Bay” district were filled in, and the peninsula was thereby enlarged to 1,829 acres. The Back Bay district, now the most exclusive residence section of Boston, was originally an inner harbor formed by the mouth of the Charles River. At the present time the city proper covers an area of about 47.8 square miles, but as it is surrounded on all the land sides by beautiful and populous suburbs, it is the center of a metropolitan district with a combined population of nearly 2,500,000.

The old business section, in the northern part of the city, is closely built and somewhat confusing to the stranger, because of its many narrow, winding streets. Some of these are seemingly the successors of the pioneer trails, and have no particular direction. Washington Street, though it is the principal thoroughfare in the section of the retail stores, is so narrow that when it is crowded there is an overflow of shoppers from the sidewalks into the street itself. Tremont Street, which skirts the Common (see *Parks and Boulevards*, below), is another important thoroughfare in the retail district, while State Street is the financial center, corresponding to Wall Street of New York.

The western section of Boston, extending to Brookline, which is reputed to be the richest town in the world, is a fashionable residence district. It is bounded on the west by the basin of the Charles River and on the east by Boylston Street. To the north and east lies East Boston, connected with the business portion by ferry, by rapid transit tunnel and a

double-track vehicular tunnel. The section called Charlestown which lies north of the Charles, is noted as the site of the Boston navy yard and the Bunker Hill Monument. Across the Charles River to the west is the suburb of Cambridge noted as the seat of Harvard University. The principal parts of the city are connected by street car lines, subways, and elevated railways. In Boston harbor are many islands of scenic and historic interest. Deer Island is a city prison.

Parks and Boulevards. Of all the parks, the Common is of the greatest interest, on account of its historic associations and its location in the heart of the city. This is an irregular shaped park of less than fifty acres. It is the oldest public park in America and has been used as a pleasure ground since the first settlements were made in and about Boston. Within the Common are found the Soldiers' and Sailors' Monument, the monument to the soldiers who fell in the Boston Massacre (see BOSTON MASSACRE), and the Shaw Memorial, one of the most beautiful monuments in America.

Directly south of the Common is the Public Garden, having an area of twenty-four acres, laid out with walks and flower plots and with a pond in the center. At the Arlington Street entrance stands the colossal equestrian statue of Washington, considered to be one of the six great equestrian statues of the world. There are also several other statues, including one of Edward Everett and one of Charles Sumner. Extending from the Public Garden into the fashionable Back Bay district is Commonwealth Avenue, the finest boulevard in the city. It is 240 feet wide, and through the center there runs a parkway beautified by trees, walks and statuary. On both sides of the boulevard are handsome residences and apartment houses.

The parks mentioned are a part of the park system of Boston proper, but they are connected by boulevard with an outer, or metropolitan, system which includes fully 11,500 acres within a radius of ten or twelve miles. Among the outer parks are the Middlesex Fells, still showing in places their virgin loveliness, and the Blue Hill Reservation, a section of beautiful hill country.

Historic Places. Among the interesting historic structures, the Old Statehouse, on Washington Street at the head of State, is perhaps the most important. The present

structure was built in 1748, and it has served in turn as townhouse, courthouse, statehouse and city hall. Within this building were enacted many of the scenes closely related to those events which led to American independence. King's Chapel, at the corner of Tremont and School streets, was established in 1689, and the present structure was completed in 1753. This was the church attended by the royal governors and other officers of the crown during the colonial period. Christ Church, which is known as the Old North

Hall, often known as the "Cradle of Liberty," was first built as a market house (see FANEUIL HALL).

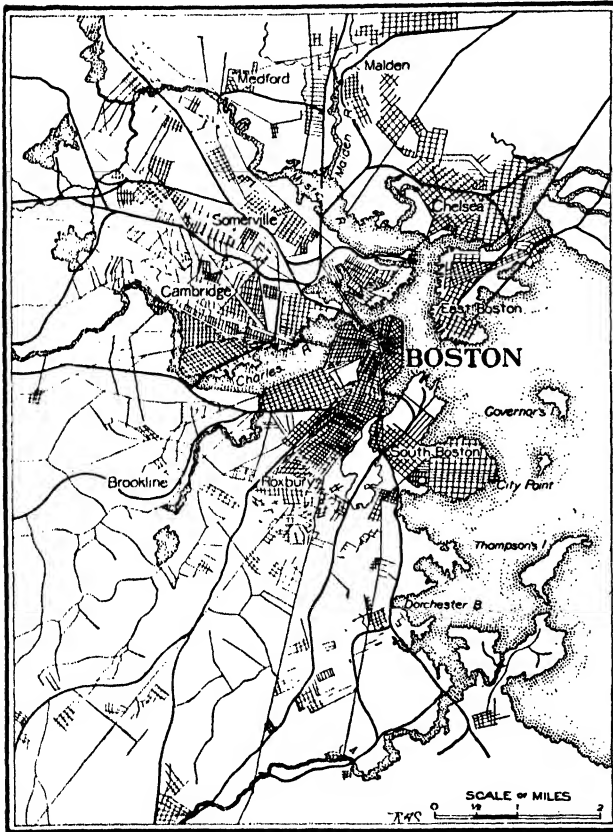
Associated with some of the older buildings and streets are a number of burying grounds of great historic interest. Among these are King's Chapel Burying Ground, containing many quaint old gravestones and the remains of some of the most noted of the early colonists, among them Governor John Winthrop and his son and grandson, the wife of Governor Andros, and John Cotton. Copp's

Hill Burying Ground was the second burial place established within the town. It contains the graves of Increase, Cotton and Samuel Mather, Chief Justice Parker and many who were noted for the part they took in the Revolutionary struggle. The Old Granary Burying Ground, on the north side of Tremont Street, between Park and Beacon, is also one of great interest. It contains the remains of many distinguished persons, among them Paul Revere, the Hancock family and Samuel Adams.

Public Buildings. The most prominent of buildings which have either been enlarged or modernized is the Statehouse, occupying the summit of Beacon Hill near the center of the city, and noted for its immense gilded dome. The Statehouse extension, begun in 1890, is of yellow brick with trimmings of white marble, and maintains the old colonial style of architecture. The grounds about the building are beautifully kept and contain a number of monuments of historic interest.

Other buildings of note are the city hall, the county courthouse, the Federal building, the customhouse, Boston Athenaeum, the North and South railway passenger stations, the Boston Chamber of Commerce, and the Park Square office building.

The finest architectural center in the city is Copley Square, about which are grouped the public library, Trinity Church and the



BOSTON AND VICINITY

Church of Longfellow's Paul Revere's Ride, stands at the north end of Salem Street. It was from the belfry of this church that the signal lanterns were hung which notified Paul Revere of the march of the British. The Old South Meeting House, at the corner of Washington and Milk streets, is one of the most noted historic structures in America (see OLD SOUTH MEETING HOUSE). Faneuil

new Old South Church. These, with the Roman Catholic Cathedral of the Holy Cross, the First Spiritual Temple (Spiritualist) and the First Church of Christ (Scientist) are among the most prominent church edifices in New England. Boston is well supplied with playhouses many of them of historic interest. Among these are the Colonial, the Hollis, the Tremont, the Plymouth, the Wilbur, the Shubert, the Fine Arts, and the Repertory. The Majestic and Keith's are also noted playhouses. Symphony Hall, which is occupied by the Boston Symphony Orchestra for its concerts, is one of the finest music halls in the country. Another stately edifice is the Boston Opera House, in the Fenway district.

Public Institutions. Boston has many public institutions. First among these is the public library, housed in its magnificent building on Copley Square. The building is of Milford granite, is rectangular in form and surrounds a court containing a fountain and other beautiful appointments. The interior is noted for its architectural and mural decorations, the latter including Abbey's masterpiece, *The Holy Grail*. This library has the largest circulation of any library of its kind the world over, and its collection on Shakespeare and that on music are unsurpassed. Among other important libraries are the Boston Athenaeum, with 250,000 volumes, and the Boston Medical Library, with 80,000.

Boston offers exceptional facilities to the student. Its excellent public school system is supplemented by a wide variety of higher educational institutions. Among these are the Boston University, Boston College, Simmons College (for women), the medical school of Tufts College and the medical and dental schools of Harvard University. The famous Massachusetts Institute of Technology has since 1916 been located in Cambridge, on the Charles River. The Boston Latin School (founded in 1635) and the English High School occupy one of the largest school edifices in America. In the city, too, are the New England Conservatory of Music, with 3,000 students, the Massachusetts Normal Art School and the Isabella Stewart Gardner Museum.

Boston has not failed to provide for those who need special help. The Perkins Institution for the Blind, located in nearby Watertown, is the best school of its kind in the United States. There are a number of

excellent hospitals and all the charitable institutions needed by a city of Boston's rank. The Massachusetts General Hospital, established in 1799, has an excellent training school for nurses. The Peter Bent Brigham Hospital is also an institution of the highest rank. Most of the penal institutions are located on islands in the harbor.

Commerce and Industry. Boston is the commercial and financial center of New England, and is one of the largest among American ports in amount of foreign trade. In normal years this has an aggregate value of over \$400,000,000. As a wool port it ranks second to London and is the leading fish port in the western hemisphere. The exports include meat and other food products, leather, cotton and woolen goods and iron and steel products, and the imports include wool, hides, sugar, drugs, fish and rubber. Manufacturing increased at a market rate during the nineteenth century, and now the city's output has an annual value of over \$1,000,000,000 in normal times. Among the leading manufactures are refined sugar, boots and shoes, clothing, pianos and the exports already enumerated. Shipbuilding is an industry of great and increasing proportions. The city is renowned as the center of important printing and publishing establishments.

Boston has a large and well-protected harbor, which has been improved by the construction of immense docks; America's entrance into the World War greatly stimulated the development of the harbor facilities. The largest drydock on the Atlantic coast, in South Boston, was completed in 1918. Boston is the chief New England terminal for the great airway system which covers the United States and Canada.

To take care of its domestic trade the city has made adequate provision. The Boston & Maine, the New York, New Haven & Hartford, the Boston & Albany and some smaller roads make Boston their terminal, and on the water front have been erected two great stations—the North and the South stations. The latter, which covers thirteen acres, is one of the largest in the world.

People. Though Boston is popularly supposed to be the home of the oldest American families, and a center of native American stock, in reality it has a very large proportion of foreign-born inhabitants. In 1930, when the population was 781,188, there was a foreign-born percentage of 29.9; only 25.6

Questions on Boston

(An outline which can be used as a type for any city of the size of Boston accompanies the article City.)

Where did its popular name, "The Hub," originate?

Why is Boston sometimes called "the Athens of America"?

What is the Back Bay district?

Why is it difficult to keep your sense of direction in Boston's business section?

How far is Boston from New York? From Springfield, Mass.?

What reputation does Brookline enjoy? For what is Cambridge noted?

What is the oldest pleasure park in America?

What Boston park possesses a famous equestrian statue of Washington?

Name six famous Americans buried in Boston.

Why is Faneuil Hall called the "Cradle of Liberty"?

In what church did Paul Revere's friend hang the lanterns that served as a signal?

What is the most conspicuous feature of the Boston Statehouse?

What masterpiece among mural paintings hangs in the Boston Public Library?

What claim has Boston to its reputation as an educational center?

How does Boston compare with New York as a port? With London?

What nationalities in Boston have the highest percentage of the foreign population?

What has been the city's increase in population since the outbreak of the Revolutionary War?

Describe the city's most beautiful boulevard. What two park systems do the boulevards connect?

Where did the name Tremont originate?

What does Bunker Hill Monument commemorate? Who paid for it?

In what year was part of Boston destroyed by fire? What other American city was nearly wiped out the year previous?

per cent were of pure American stock. The Canadians and Irish predominate among the foreign element, representing about 40 per cent of the total foreign population. The other foreign nationalities include the English, Scotch, German, Italian and Russian-Jew.

History. No one can appreciate or understand early American history without knowing the part that Boston played in the young nation's annals. In the year 1614 Captain John Smith had sailed into Boston Harbor, but the city's real history began in 1630, when a band of colonists under John Winthrop moved over to the peninsula from Charlestown. The peninsula was then called *Trimountaine*, from its three hills—Beacon (the present site of the Statehouse), Copp's, and Fort (since leveled). In September of the same year Boston was officially adopted as the name of the settlement, in honor of the town in England that had been the home of some of the settlers. Boston became the capital of Massachusetts Bay Colony in 1632, and it speedily developed as its religious and educational center, as well. Every American school boy knows the story of the Boston Tea Party, the Boston Massacre, the Battle of Lexington and the Bunker Hill fight, all of which occurred in Boston or its vicinity as preliminaries to the Revolutionary War. At that time the place had a population of 20,000, and was the center of opposition to England.

After the close of the Revolutionary War, the city advanced rapidly in wealth and prosperity. The first Cunard liner entered its harbor in 1840, and from that time to the Civil War the shipping industries were very important. Boston was one of the leading centers in the anti-slavery movement, and during the Civil War its citizens stood staunchly by the Union and furnished their full quota of men for the army and navy. Several disastrous fires have visited the city, the most noted being that of 1872, which laid waste fifty acres in the business section. The burnt district was immediately rebuilt on greatly improved plans. The city has grown rapidly and more beautiful, although in the process many of the old historic structures were removed to make room for improvements. Rapid transit facilities have brought the adjacent cities into closer union with Boston and with each other, to their great common interest and advantage.

BOSTON MAS'SACRE, an affray between a mob of Boston citizens and a squad of seven British soldiers, which occurred on March 5, 1770. It was the result of the violent opposition of the Bostonians to the stationing of British regulars in the city in time of peace. The affray took place on King, now State, Street, and resulted in the killing of three and the wounding of seven citizens. The soldiers who were responsible were tried for murder and were defended by John Adams and Josiah Quincy and acquitted. The garrison, however, was removed to Castle Island.

BOSTON TEA PARTY, the name given to a raid on English tea ships by a body of Boston citizens, December 16, 1773. It resulted from the opposition of the colonies to the imposition of a parliamentary tax upon tea. When ships were sent by the English East India Company to various ports in the colonies, the Americans took vigorous action to prevent the collection of the duty. In Boston a body of citizens, disguised as Indians, boarded the vessels and threw 342 chests of Indian tea into the harbor. The story of the "tea party" is one of the famous true tales of the Revolutionary period.

BOSTON UNIVERSITY, a coeducational institution established in Boston, Mass., in 1869, under the auspices of the Methodist Episcopal Church. The university includes colleges of liberal arts, business administration, practical arts and letters, and music, and schools of theology, law, medicine, education, physical education, religious education and social service. It also maintains a graduate school for advanced students. The university libraries contain more than 61,000 volumes. The faculty numbers 570 and the average enrollment is about 12,000.

BOSWELL, *boz'wel*, JAMES (1740-1795), the friend of Dr. Johnson, whose life of that distinguished writer is a masterpiece of biographical writing. During all the time he was with Johnson, Boswell occupied himself with noting down every word and action of his famous companion, and his *Life of Samuel Johnson*, which appeared in 1791, is almost universally admitted to be the best piece of biography in English. It is because of this masterly biography that we remember Johnson rather as a man than as a writer. Boswell was educated at Edinburgh and Cambridge and became a member

of the Scottish bar. In 1763 he became acquainted with Johnson, whom he had for some time previously greatly admired. During a year's travel on the Continent he became acquainted with Voltaire, Rousseau and Paoli, and through Paoli he became deeply interested in the cause of Corsican independence. In 1773 Boswell was admitted to the famous club of which Johnson, Burke, Goldsmith and Reynolds were members, and later in the same year he accompanied Johnson on a tour to the Scottish highlands and the Hebrides. An account of the excursion appeared in 1785.

BOSWORTH, *boz'wurth*, **FIELD**, **BATTLE** or, a great battle fought on the moor two miles south of the English market town of Bosworth, in August, 1485. By this battle the Wars of the Roses were closed, and the Earl of Richmond was made king of England in the place of Richard III, who was killed in the battle. See **ROSES**, **WARS OF THE**.

BOTANIC GARDEN, a garden in which plants are cultivated for the purpose of scientific study. Until modern times their sole design was the cultivation of medicinal plants. Modern botanical gardens are usually connected with universities or are under government control. In the United States there are many collections of plants, but few bear the name of botanic gardens and none has reached the rank of European establishments. *Conservatory* is a name heard more frequently in America.

The most extensive and best known are the Shaw Gardens of Saint Louis, now known as the Missouri Botanic Gardens, and kept in connection with Washington University; the botanic gardens at Cambridge; the Arnold Arboretum at Brookline, in connection with Harvard University, and the magnificent New York Botanical Garden, occupying 250 acres in Bronx Park, New York City. The chief gardens in Great Britain are the Royal Gardens at Kew, near London, and those at Edinburgh, Oxford and Dublin. Of the numerous ones in France, the *Jardin des Plantes* in Paris is the most noteworthy and has probably the largest collection of living plants, including about 15,000 species. Other famous European gardens are located at Bologna, Strassburg, Munich and Leipzig. There is also a very fine garden at Montreal, Canada.



BOTANY, the science of plants. This is the simplest and broadest definition that can be given of one of the most fascinating of studies, but it is too broad to stand without further explanation. Botany deals with the description of plants and their parts, their habits and distribution, their relations to one another and to mankind, and their classification. It therefore covers a multitude of topics and is directly connected with several

other sciences, such as chemistry, physical geography, medicine and economics.

The Beginnings of Botany. It is easy to imagine how the science of botany began. Wherever men live there are plants of some kind, and always have been, and men must always have paid more or less attention to them. At first, no doubt, the plants were looked upon just as were the rocks or the clouds or the hills; they were there through no art of man's, and it was not his duty or business to take care of them or develop them. When, without his aid, they produced fruits that might be eaten, he ate them; but he troubled himself little about the plants from which they came. But, naturally, as men grew more and more civilized, they came to take a more intelligent interest in their surroundings, and the differences in the various plants about them drew their attention. Some lost their leaves with the coming on of colder weather, and brought out fresh ones in the spring; some kept the same leaves all the year round; some had flowers, but no fruit; some had most insignificant flowers, but gorgeous fruits. And, besides, they were useful for different things. The stems of some might be eaten, the roots of others, the leaf buds of others; from some, medicines were made.

Perhaps it was this last-mentioned fact which first led students to give serious attention to the study of plants; the beginnings of the science of botany seem to have concerned themselves most with medicinal plants. We know that a Greek writer, Theophrastus, in the fourth century B. C., wrote a treatise called the *History of Plants*, in which

he told of about 500 kinds that were useful in healing diseases, and in the first century of the Christian Era, Pliny the Elder described about 1,000 plants, many of which were used as medicines.

It is not strange that these ancient writers, studying the subject, as they were, with a definite end in view, paid little attention to the classification of plants. Indeed, even the merest hint of such classification as modern botanists make would have been impossible for them. Certain plants resembled other plants so much that their relation was evident; but others looked much more like members of entirely different families than they did like certain members of their own family.

In the sixteenth century, when there was a renewed interest in everything, botany shared in the awakening. Books were published in various countries, describing plants and giving really beautiful woodcuts of them; but still the interest was chiefly on the medical side of the science. Gradually more and more definite attempts were made at systematic classification, until the time of Linné, or Linnaeus, in the eighteenth century. Linnaeus is looked upon as the originator of modern systematic botany, and more exact and elaborate classifications grew out of his outlines.

How Plants are Classified. The system of classification now generally adopted separates the vegetable kingdom into two great divisions, the first of which contains four groups, and the latter, two. The following outline indicates the characters of these groups:

I. *Cryptogams*, or spore-producing plants. The plants of this division are classified in the following groups:

1. Myxothallophytes, or slime molds, very small organisms, hardly distinguishable from the lowest orders of the animal kingdom. They are one-celled masses of naked protoplasm, resembling the amoeba.

2. Thallophytes, leafless plants of plainly cellular structure, having no distinction between stem and leaf. Among them are many important groups such as the molds, rusts and yeasts.

3. Bryophytes, small, mosslike plants, living a life of two generations, the first in the form of a plant having stem and leaves, and the second in a spore-bearing capsule attached to the body of the preceding generation.

4. Pteridophytes, the most highly organized of the cryptogams, having true roots and often well developed stems and leaves. The

life of the plant is in two generations, one being in the form of a large plant with leaves, separate from and independent of the earlier generation. The ferns are a good example.

II. Phanerogams, or seed-bearing plants. This division is composed of two classes:

1. Gymnosperms, or seed plants with naked ovaries, such as the evergreens.

2. Angiosperms, or seed plants with ovules borne in closed ovaries, living a life of but one generation. There are two subclasses of angiosperms:

(a) Monocotyledons, plants in which the embryo has but one cotyledon. The leaves are usually parallel-veined and entire, and the parts of the flower are generally in threes, never in fives. In perennial plants there are no annual rings of wood.

(b) Dicotyledons, plants in which the embryos have two or more cotyledons. This subclass contains the greater part of the flowering plants. Their stems are composed of bark, wood and pith, and the parts of the flowers are usually in fours or fives.

Botany for Boys and Girls. There are many things about botany which any child can and should learn—things which are as interesting as a story. We have dogs or cats or canaries as pets, and we say that they are interesting because they are alive, they have sense, they do things; but we would never think of saying, "I have a bed of pet pansies," or "I have a lily and a rosebush for pets." And yet, if we study about them, we find that plants, too, are alive; they do things, and it almost seems to us sometimes that they have sense.

Did you ever stand in a garden and look at a tall, beautiful white lily? It seems strange, as you look at it, that from the black soil at your feet could come the materials to feed anything so pure and white. And now just look down; there beside the lily grows an ugly weed—a cocklebur. It is dusty and brown, with nothing beautiful about it, and everyone calls it a nuisance and wishes it out of the way. Does it not seem wonderful that those two plants can grow there, in exactly the same ground, within a few inches of each other, and each choose from the soil just the elements it needs to make it what it is? The lily takes up water and food from the ground and turns it into smooth green leaves and beautiful waxy white petals; the cocklebur takes up water and food and turns it into harsh, rough leaves and troublesome burs. Could anything that is really "alive" do more than that?

Weeds. We ourselves would not have to think twice as to which we would choose to look at, the lily or the cocklebur; but if a botanist came into our garden he might turn from the lily we are so proud of and give his attention to the ugly bur. In fact, botanists are particularly interested in weeds, for one reason. No matter whether we have flowers or vegetables growing in our yards, we have to take care of them; a bed of sweet peas will soon die out if the sun beats too hot upon it; a garden bed of tomatoes will soon wither if it is never watered. But weeds are different; they do not need to be watered or shielded from the sun; the earth does not need to be



IS THIS A BEAUTIFUL FLOWER OR A WEED?

loosened up about their roots. And it is just this ability to live in spite of everything which makes weeds interesting to botanists. Did you ever stop to think what makes a weed a weed? One of the flowers we like best is the daisy; if we buy it at a florists we call it a marguerite. In some parts of the United States, and in Canada, there is a weed which the farmers hate, which they call whiteweed; it is almost impossible to get rid of it, and it chokes out other crops if it isn't constantly watched. Our marguerite and the farmers' whiteweed are the same. Any plant

BOTANY

SCOPE AND HISTORY

1. Modern botany deals with plants, their forms and uses. How they breathe, grow and reproduce. Their distribution, classification, relation and value.
2. Theophrastus, 300 B.C., began to write on botany.
3. No scientific study until Linnaeus fixed his system.
4. Darwinian theories have revolutionized earlier beliefs.

TWO GREAT DIVISIONS

I. Cryptogams—Spore-producing Plants.

1. **Myxothallophytes or Slime Molds**
 - a. A group of plants of very simple structure.
 - b. Hardly distinguishable from the lowest order of animals.
 - c. They are one-celled masses of protoplasm.
 - d. They live upon rotting wood.
 - e. At one period of its life the slime mold develops spores. In the process, the form modifies until it closely resembles an amoeba.
2. **Thallophytes**
 - a. Leafless plants of plainly cellular structure.
 - b. No distinction between stem and leaf. Many important groups.
 - c. Diatom. Singly, invisible to the naked eye. Found in rain troughs, ditches, even in the dust of volcanoes.
 - d. Lichens. Of a leaf-like thallus living on the air, composed of algae and fungi. Grow upon rocks and barren soil. Dyes used in chemistry taken from lichens, and they give rise to plants of a higher order.
3. **Bryophytes**
 - a. Small moss-like plants, living a life of two generations.
 - b. In the first it has stem and leaves like a plant.
 - c. In the second, a spore-producing capsule attached to the body of the first generation.
4. **Pteridophytes**
 - a. The most highly organized of the cryptogams. Ferns; club moss.
 - b. Has true roots, and often well-developed stems and leaves.
 - c. Its life covers two generations.

II. Phanerogams—Seed-producing Plants.

1. **Gymnosperms**
 - a. Coniferae, or Pine family.
 - b. Called coniferate, or cone-bearing, because of their peculiar fruit.
 - c. Leaves slender and needle-like.
 - d. The pollen, distributed by the wind, composed of minute grains which fly about as yellow dust.
 - e. Cypress, fir, hemlock, larch, pine, spruce, yew.
2. **Angiosperms**
 - a. **Monocotyledons**
 1. Plants in which the embryo has but one cotyledon. Grasses, palms, lily family, orchids.
 2. Leaves usually parallel-veined and entire.
 3. Parts of the flowers generally in threes, never in fives.
 - b. **Dicotyledons**
 1. Plants in which the embryos have two or more cotyledons.
 2. This class contains the greater part of the flowering plants.
 3. Stems composed of bark, wood and pith.
 4. The parts of the flowers usually in fours and fives.
 5. Cruciferae, Leguminosae, Compositae, Labiatae, etc.

1. Calyx.

- a. The outermost circle.
- b. Divided into separate parts -sepals.
- c. Its function: to protect the more delicate parts within.

2. Corolla.

- a. The parts called petals.
- b. Usually bright colored, designed to attract insects and birds.
- c. For the protection of stamens and pistils.

3. Stamens.

- a. The stem or filament.
- b. The anther, a sack at the top.
- c. The pollen. Ripened within the stamen.

4. Pistils.

- a. The innermost organs.
- b. The ovules. Contained in an enlarged chamber.
- c. The pollen must be carried to the pistils in order to fertilize the ovules, which thereafter become seeds.
- d. A stem called the style, and a tube, called the stigma.

PARTS

NATIONAL

1. Canada, Sugar Maple.
2. Egypt, Lotus, one of the oldest of national flowers, sacred to the god Osiris.
3. England, Rose. On the English coat of arms are engraved the English rose, the Scotch thistle and the Irish shamrock.
4. France, Fleur-de-lis.
5. Germany, Kaiserthume, or corn flower.
6. Greece, Blue Violet.
7. India, Lotus. The natives believe that in its bosom Brahma was born.
8. Ireland, Shamrock.
9. Italy, the White Lily.
10. Japan, Chrysanthemum.
11. Mexico, Cactus.
12. Persia, Rose.
13. Scotland, Thistle.
14. Spain, Pomegranate.
15. Switzerland, Edelweiss.
16. United States, Goldenrod.

FLOWERS

1. Primary. Production of seeds.

2. Secondary.

- a. Beautifying the earth.
- b. For commercial ends.

USES

1. Construction.

- a. In one flower only stamens may be found. The pistils may be in another flower on the same plant. Or, a flower may contain pistils only.
- b. The parts of each circle may be so grown together as to render it impossible to distinguish the circles.

2. Forms.

- a. The meaning of many strange shapes not fully determined.
- b. Forms explained by the way the pollen is carried from stamens to pistils.

3. Colors.

- a. Methods of attracting insects and birds.
- b. Thus the astonishing and attractive irregularities, such as the cactus, prickly pear, passion flower.

VARIATIONS

- | | | |
|----------------------------------|----------------------------------|----------------------------------|
| 1. Alabama, Goldenrod. | 16. Michigan, Apple Blossom. | 24. Oklahoma, Mistletoe. |
| 2. Arkansas, Apple Blossom. | 17. Minnesota, Moccasin. | 25. Ohio, Carnation. |
| 3. California, Poppy. | 18. Mississippi, Magnolia. | 26. Oregon, Grape. |
| 4. Colorado, Columbine. | 19. Missouri, Hawthorn. | 27. Rhode Island, Violet. |
| 5. Connecticut, Mountain Laurel. | 20. Montana, Bit-terroot. | 28. South Dakota, Pasque Flower. |
| 6. Delaware, Peach Blossom. | 21. Nebraska, Goldenrod. | 29. Tennessee, Passion Flower. |
| 7. Florida, Orange Blossom. | 22. New York, Rose. | 30. Texas, Bluebonnet. |
| 8. Georgia, Cherokee Rose. | 23. North Dakota, Wild Rose. | 31. Utah, Sego Lily. |
| 9. Idaho, Syringe. | 24. Louisiana, Magnolia. | 32. Vermont, Red Clover. |
| 10. Illinois, Violet. | 25. Maine, Pine Cone and Tassel. | 33. Washington, Rhododendron. |
| 11. Indiana, Zinnia. | | 34. West Virginia, Rhododendron. |
| 12. Iowa, Wild Rose. | | 35. Wyoming, Indian Paint Brush. |
| 13. Kansas, Sunflower. | | |
| 14. Louisiana, Magnolia. | | |
| 15. Maine, Pine Cone and Tassel. | | |

may be a weed if it grows where it is not wanted and becomes troublesome to the farmer or gardener.

Another strange thing about weeds is that many of them which are now looked upon as the worst pests were brought to this country purposely. The tansy, the field-garlic, the ox-eye daisy, the wild carrot are a few of the weeds which we all know which were, for one reason or another, introduced into this country.

Uninvited Guests. There is a word we use often which comes from an old Greek word that meant "eating at another's table"—it is the word *parasite*. Probably at first the word had no unpleasant meaning, but meant any invited or welcome guest. But gradually it came to mean a man who, uninvited and unwelcome, thrust himself upon his host and

feed on them. We have all seen such parasites, though probably we have not always recognized them. Have you ever noticed on the top of a jar of preserves or on a crust of bread that has been left in a damp place a furry-looking covering? That is a parasite plant, and it is feeding not on another living plant, but on a plant product. The mildews on leaves and fruits, the wheat rust which so often destroys a wheat crop, the yeast with which your mother makes bread, the mushrooms you eat with your beefsteak, are all parasite plants.

There are others which are more interesting, because they are larger and can be examined more easily. One of these is the dodder. It starts life like any self-supporting plant, with its roots in the ground, but just as soon as it is old enough it begins to send



SOME UNINVITED GUESTS: MUSHROOM, DODDER AND MISTLETOE

stayed and stayed, doing nothing to pay for his keep, but just living off his host. From this the word came to mean anyone who demands and obtains a living from other people without giving anything in exchange for it. You probably think at once of the tramps and able-bodied beggars that you see from time to time, asking for food and money without showing the least willingness to work for it. Now it is not only in the animal world that parasites exist; there are plant parasites—many of them—and they attach themselves to plants which are called their *hosts*, and

out little stems, reaching for some host on which it can fasten itself. When the stems find such a plant they twine around it and send little roots down into its stem, to draw away the food which the host plant wants for itself. Then the first ground root dies, and the dodder is left, a parasite for the rest of its life, clinging to another plant.

Some parasite plants are not altogether lazy—they take part of their food from the host plant and make the rest for themselves. Such plants have green or greenish leaves, which a real parasite never does. At Christ-

mas time when we trim our houses with the sturdy holly we put with it the mistletoe, which is a half-parasite. It grows on the branches of trees, down in the southern part of the United States; and often, unless the trees are very strong, the mistletoe must be cut off every year, or else it will steal so

The sundew has another way of capturing its food. The leaves are covered with hairs, which give out a sticky liquid. When a small insect touches these sticky hairs he is held fast, and the hairs at once close over him. They remain closed until all the plant wants of the insect have been absorbed, and



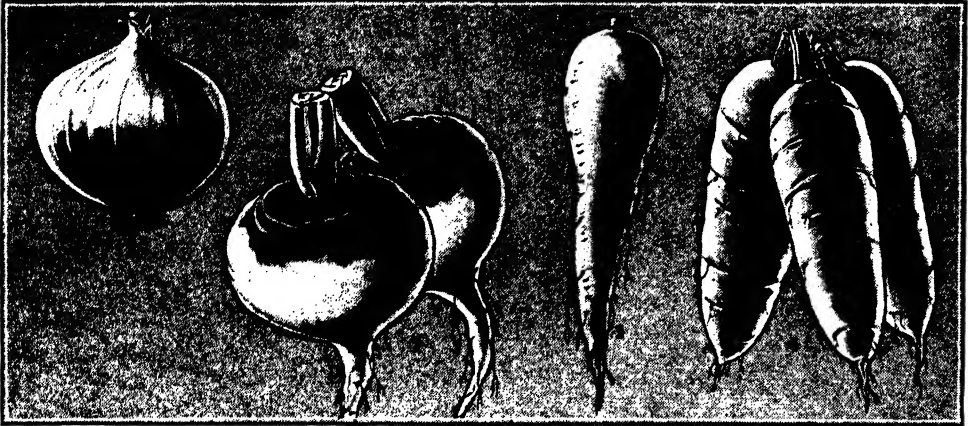
THE PITCHER PLANT AND VENUS'S FLYTRAP
They need insects for food.

much of its host's food that the host will die.

Insect-eating Plants. We have talked so far of plants which get their food straight from the soil or from other plants; but there are some strange plants that want another kind of food—animal food. They capture insects, in one way or another, and draw from their decomposing bodies the substances they need. If you could see a collection of such insect-eating plants you would find that they all have some special means of catching and holding the insects. The pitcher-plant, which you may find in swampy woods, has leaves which are shaped like pitchers, and which usually contain some water. The insects fall into the pitchers, or in some cases enter them in search of the honey which the leaves secrete, and are drowned.

then they open and allow the useless part of the insect to drop off. The Venus's flytrap has leaves which are hinged in the middle and which have three short hairs on each side of the hinge. When these hairs are touched by an insect, the two sides of the leaf come together with a snap, and usually the luckless insect is caught. Of course the plants cannot actually know why they have to catch and make use of these insects; but every plant must have nitrates if it is to live, and it is these which the cannibal plants draw from the bodies of their victims.

Plants that Store Food. During the fall the squirrels are very busy running about the woods gathering nuts and carrying them off to some hole in the tree. They gather far more nuts than they can use at



SOME PLANTS THAT STORE FOOD

1. Onion. 2. Turnips. 3. Parsnip. 4. Carrots.

the time, and they store them. Plants, of course, go about the matter differently, but they, too, often manufacture more food than they need and store it up. When you eat potatoes or turnips or carrots or onions, you are eating food which the plants manufactured and stored up. In some cases it is not so easy to see why the food was stored; in other cases it is just as simple as the squirrel's reason for storing up the nuts. The beet, the carrot, the parsnip, the turnip are what is known as *biennial* plants, that is, two-

year plants. This means that if they are planted one spring they do not go to seed until a year from the following fall. The first year these plants store up food in their roots, and send up above the ground only leaves; the second year they use the food which they had stored to build a tall stem, which bears on its top the flowers and finally the seeds. If you will pull up a carrot that has gone to seed you will find that the root has withered and shriveled—almost all the stored-up food has been used. The



DO YOU SEE MUCH FAMILY RESEMBLANCE?

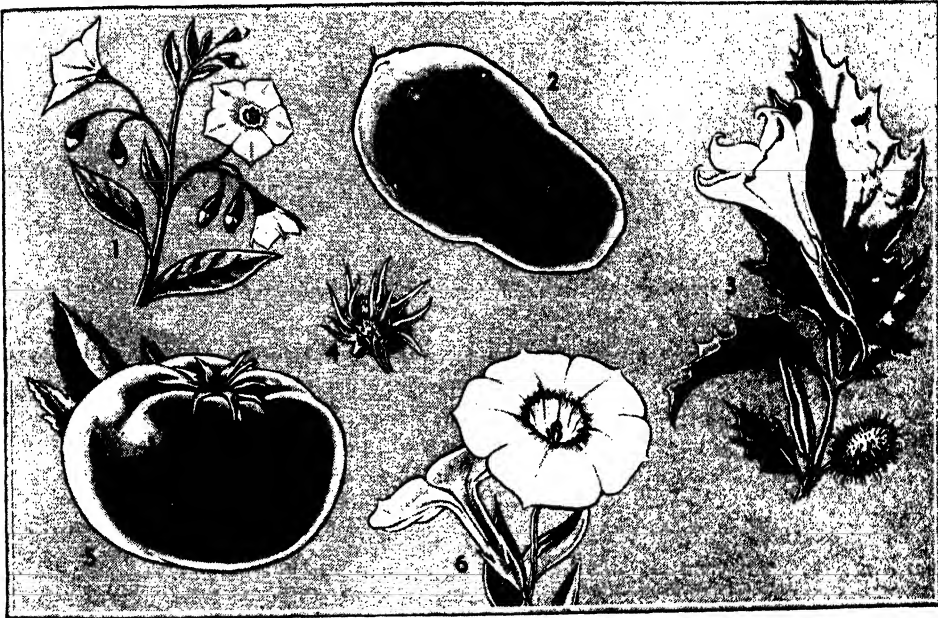
1. Rose. 2. Apple. 3. Peach. 4. Blackberry. 5. Strawberry.

onion acts in much the same way, but in the case of the onion it is a part of the stem, which we call the bulb, in which the food is stored.

Plant Families. Another thing about plants which may seem very strange to us is their family connection. We know that, in the animal world, the cat, the tiger, the panther, the lion all belong to the same family; but there is nothing extraordinary about that. A dog and a wolf look enough alike to be cousins, if not brothers. And so, in the plant world, we should not think it wonderful if we were told that the blackberry and the raspberry belong to the same

the trilliums. Did you ever think when you picked the yellow dog-tooth violets, or the white and red trilliums that they were related to the lilies? But there are stranger members than that in this big family. Out in the fields you have touched at times the wild onion or the field garlic, and you have wished afterward that you had kept away from them, the scent is so unpleasant. Yet those bad-smelling weeds belong to the same family with the lily-of-the-valley and the hyacinth, some of the sweetest flowers that grow.

There is one member of this wonderful family that comes to our table often, and



THE NIGHTSHADE FAMILY

1. Nightshade. 2. Potato. 3. Jimson weed. 4. Sandbur. 5. Tomato. 6. Petunia.

family, for, indeed, they do. But many of the plant families are very large, and some of the members do not seem to have the least resemblance to each other. We will look at some of these families, examining all the members that we are acquainted with.

The first is the lily family—botanists call them the *Liliaceae*. The name is familiar; you know a number of beautiful flowers that bear it. But unless your attention has been called to some of the relatives of the lily, you probably have never suspected them of being relatives. First, there are the tulips and the hyacinths, the dog-tooth violets and

we are usually very glad when it is time for it to come. It doesn't look like a lily in any way, and yet botanists can prove to us by pointing out resemblances that we cannot see, that it does belong to that family. This is the asparagus. Would you ever have believed that it was possible? Some members of this family and also members of the rose family are shown in the color plates in connection with the articles *LILY* and *ROSE*.

We have just referred to the rose family. "O yes," you say, "I know that is a big family. There's the moss rose and the tea

rose and the American Beauty and the wild rose and the cinnamon rose, and dozens and scores of others." You are right; it is a big family—bigger than you think. If someone were to ask you whether you could get on without the rose family you might think of all the beauty that would go out of the world with the roses, and you would sigh. But would it occur to you that you could never again have apple pie or cherry pie, that no quince jelly or plum jelly would

very much like a wild rose? The petals on the little blossoms are smaller, but they are much the same shape and are placed in much the same way. And it is the wild rose which really represents the roses—all the other beautiful kinds have come from it.

There are other families which seem to us strange; there is the pulse family, which includes the locust, the clover, the acacia, the peas and beans. Look carefully at a red clover blossom; does not one of the tiny



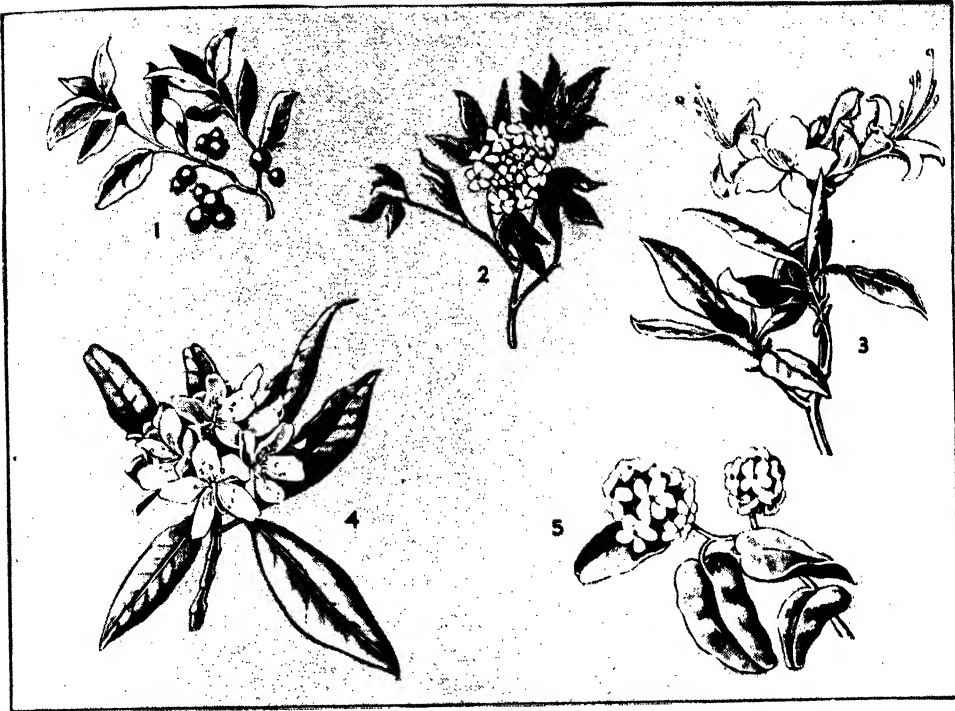
THE BUTTERCUP FAMILY

1. Hepatica. 2. Anemone. 3. Larkspur. 4. Peony. 5. Buttercup.

ever come to your table again; that no luscious strawberries or raspberries or blackberries would ever be heaped up before you, waiting for the sugar and cream; that you would have no velvety peaches or yellow pears, nor even any almonds to crack of a winter's night? It really doesn't seem possible; but it is a scientific fact that all of those fruits do belong to the wonderful family that includes the roses and the sweetbrier and the exquisite bridal-wreath. And there are family resemblances which even we who are not botanists can see. Just take a strawberry blossom or a blackberry blossom or an apple blossom and examine it. Doesn't it, after all look in many ways

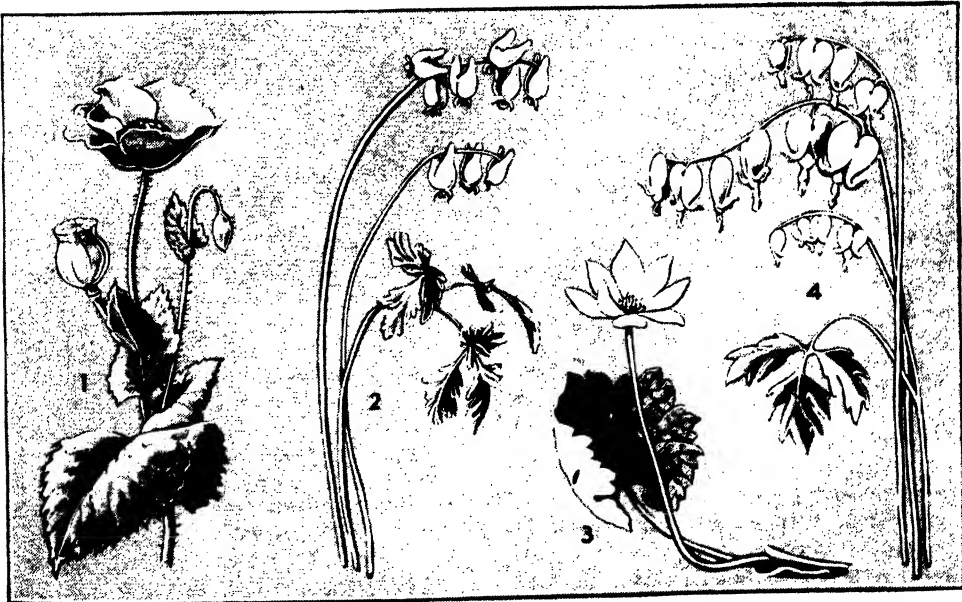
flowerets of which it is made up look very much like a sweet pea? If you had before you a yellow buttercup, a blue larkspur, a red peony, a white anemone and a pink hepatica, would you think of them as relatives? They are, and the little buttercup has given its name to the family. The poppy is a big, flaring flower; the bleeding heart is as different from it in shape, size and manner of growth as can well be imagined. And yet these two, with the Dutchman's breeches and the bloodroot make up a part of the poppy family.

We have found out so many strange things about plant relations that perhaps it will not be surprising to learn that the



THE HEATH FAMILY

1. Huckleberry. 2. Cranberry. 3. Azalea. 4. Rhododendron. 5. Trailing arbutus.

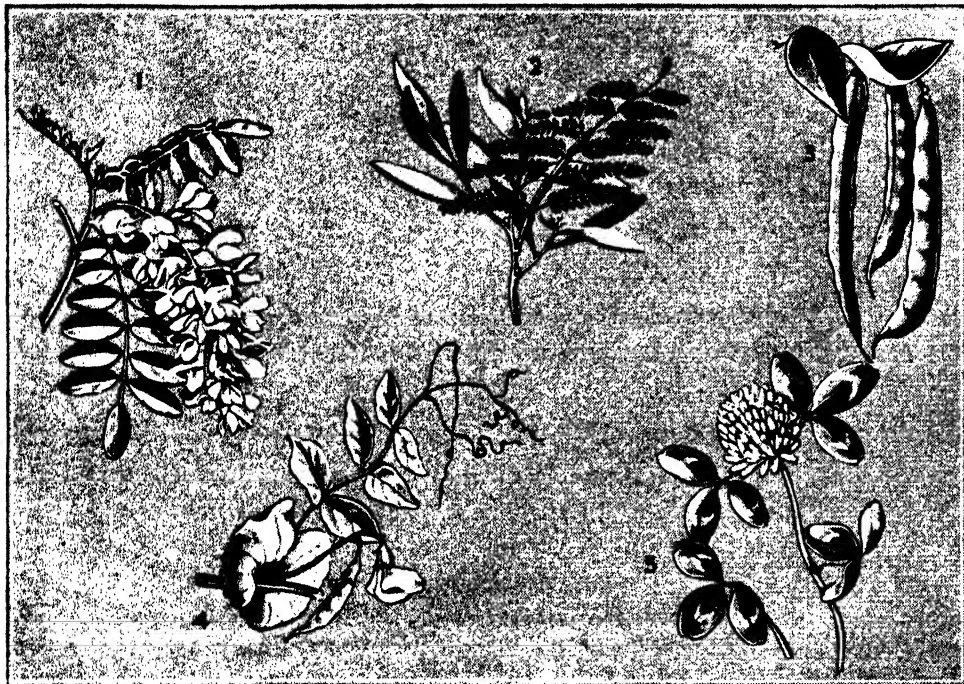


THE POPPY FAMILY

1. Poppy. 2. Dutchman's breeches. 3. Bloodroot. 4. Bleeding heart.

heath family includes, besides the gorgeous rhododendron and the exquisite trailing arbutus, the azalea, the cranberry and the huckleberry. But even these striking discoveries cannot have prepared us for the fact that the nightshade, the sandbur, the jimson weed, the potato, the petunia and

it meant the hard time people have getting enough to live on; but it refers to the animals, and, which interests us more now, to the plants as well. Plants have many things to fight; many things which keep them from becoming as numerous and as thickly spread as they might be. For one thing, the very



THE PULSE FAMILY

1. Locust. 2. Acacia. 3. Beans. 4. Peas. 5. Clover.

the tomato are all relatives. This nightshade family is surely one of the strangest we have found.

Pictures of the members of all of the families described here are to be found on these pages. In some cases, close examination will show resemblances never noticed before; but in many instances the closest scrutiny will fail to make evident any traces of relationship. Do you think it is at all strange that men studied plants for hundreds and hundreds of years before they even began to be able to classify them correctly?

The Scattering of Seeds. See SEED DISPERSAL.

The Struggle for Existence. Did you ever hear anyone speak of the "struggle for existence"? Perhaps if you did you thought

number and millions of little plants are killed off each spring by late frosts.

When you watch cattle and sheep grazing in the fields you are watching some of the strongest plant enemies. Of course in most places the vegetation grows again; but many regions have lost all their plant life because sheep have grazed on them so long. Insects, too—the chinch bug, the locust, various kinds of beetles—destroy whole crops every year.

These are some of the enemies and the unfavorable conditions that plants have to meet. Altogether, the things that destroy plants and the things that help them to grow just about balance each other, so that vegetation is not likely to change very much from year to year. Of course man can make it change; he can plant areas that have been barren, and with care can make them flourishing green

Outline on Botany

I. PLANT PHYSIOLOGY

1. Chemical composition of plants
2. Plant foods
3. Movement of water in plants
4. Action of chlorophyll (the green coloring matter)
5. Digestion and assimilation
6. Storing of food

II. THE PLANT AND ITS STRUCTURE

1. Cells
2. Protoplasm (the substance of which cells are composed)
3. Germination
4. The root

- a. Functions
- b. Classification
 - (1) By manner of growth
 - (a) Soil-roots
 - (b) Aerial roots
 - (c) Water roots
 - (d) Parasitic roots
 - (2) By form
 - (a) Taproot
 - (b) Fascicled (cluster) roots
 - (c) Fibrous roots

- c. Structure
- d. Use

5. The stem

- a. Functions
- b. Classification
 - (1) By direction of growth
 - (2) By manner of development

- c. Structure
- d. Use

6. The bud

- a. Structure
- b. Position
- c. Kinds of buds

7. The leaf

- a. Arrangement of leaves
- b. Structure
- c. Functions

8. The flower

- a. Arrangement
- b. Parts or organs

- (1) Calyx
- (2) Corolla
- (3) Stamens
- (4) Pistils

c. Reproduction

- (1) Pollination
 - (a) Self-pollination
 - (b) Cross-pollination
- (2) Fertilization
- (3) Reproduction by spores
- (4) Other methods

9. The fruit

- a. Definition
- b. Classification
 - (1) Fleshy fruits
 - (2) Dry fruits
 - (3) Aggregate fruits
- c. Dispersal of seeds

III. THE STRUGGLE FOR EXISTENCE

1. Overcrowding
2. Change of temperature
3. Lack of moisture
4. Adaptation to conditions

IV. CLASSIFICATION OF PLANTS

1. Cryptogams, or spore-plants

- a. Diatoms
- b. Fungi
 - (1) Molds
 - (2) Mildews
 - (3) Smuts
 - (4) Rusts
 - (5) Yeast
 - (6) Mushrooms
- c. Algae, or seaweeds
- d. Lichens
- e. Mosses
- f. Ferns

2. Phanerogams (seed plants)

- a. Gymnosperms (not having a closed ovary)
- b. Angiosperms (having a closed ovary in which seeds are matured)
 - (1) Monocotyledons (one seed-leaf)
 - (2) Dicotyledons (two seed-leaves)

Questions on Botany

(Some of the answers to questions will be found in subjects named in the Related Articles on this page.)

Why is it necessary that birds and insects should be attracted to the flowers? By what means are birds and insects so attracted?

What is meant when you say a flower is an annual?

Explain how some seeds are carried long distances?

Name some of the conifers.

Would you consider the oak tree a botanical specimen?

Is yeast a plant?

What is your state flower?

What is the calyx of a flower?

Why is the corolla usually highly colored?

Where do you find the pollen in the flower and of what use is it?

From what country does the lotus come?

What country has the fleur-de-lis for a national flower?

What is the national flower of the United States? How and when was it selected?

How are the state flowers adopted?

What is the state flower of West Virginia? Of Louisiana? Of Indiana? Of New York? Of Kansas?

What is the popular name of geranium?

Where has ivy been held sacred?

What kind of plant is the sundew?

Of what was the myrtle an emblem at Athens?

In what way did Darwin's theories and discoveries revolutionize botany?

What is pollen? Why is it produced in such abundance? How do insects help in the fertilization of flowers?

What are some of the methods by which seeds are scattered?

What are parasites in the plant world? Give examples.

Give uses of the following to plant life: Root, stems, leaves, flowers.

What is chlorophyll? What important work does it do for the plant?

spots, or he can cut down forests that have stood for centuries.

More Botanical Facts. In the foregoing article the subject of botany is considered only in its broadest aspects. Throughout this set of books are hundreds of facts about the subject, each appearing under its special head, where treatment is more complete than it could be given above. Therefore, consult the *Related Articles* freely.

Books for Reference. The standard guide to the identification of plants of the region east of the Mississippi River and north of Tennessee is Gray's *Manual of Botany*. Different authors have prepared similar books for the remaining sections of the country. Goodale's *Physiological Botany* is a standard authority on the structure and use of plant organs. The botanies in use in the public schools usually deal largely with the structure and function of plant organs, but many of them contain simple keys and plant descriptions which will enable pupils to identify many of the specimens that come their way. See, also, Lyon's *Flowering Plants and Vegetation*; Ward's *Romance of Plant Hunting*; Robbins and Ramaley's *Plants Useful to Man*; Bergen's *Foundations of Botany*.

Related Articles. The list below includes most of the general articles connected with botany, but many of these have special lists, to which the reader is referred.

Air Cells	Flowers (with list)
Air Plants	Fruits (with list)
Alburnum	Fungi
Algae	Galls
Amaryllis	Germination
Angiosperms	Grafting
Annuals	Grains (with list)
Aquatic Plants	Grasses (with list)
Bacteria and	Gymnosperms
Bacteriology	Herbarium
Biennials	Herbs (with list)
Boehmeria	Leaves
Botanic Garden	Leguminous Plants
Breeding	Lichens
Bryophytes	Molds
Bud	Mosses
Bulb	Nature Study
Carnivorous Plants	Nut (with list)
Catkin	Osmosis
Cell	Parasite
Cellulose	Perennials
Chlorophyll	Phanerogamous Plants
Citrus	Plant (with list)
Colchicum	Pollen
Composite Family	Pteridophytes
Coniferae	Puffball
Cotyledon	Ranunculus
Cross Fertilization	Roots
Cryptogamous Plants	Rusts
Cycads	Sap
Diatom	Seeds
Diseases of Plants	Seed Dispersal
Protoplasm	Spice (with list)
Dyeing	Sport
Ecology	Spurge Family
Etiolation	Stems
Evergreen	Umbelliferae
Exotic	Vegetables (with list)
Ferns	Venation
Fiber	Weeds (with list)
Flora	Yeast

BOTANY BAY, a bay on the eastern coast of Australia, about nine miles south of Sydney, the Capital of New South Wales. It is about twenty miles in extent. It was entered by Captain Cook in 1770, when he took possession of New South Wales in the name of the British sovereign. It received its name on account of the great number of new plants found in its vicinity. In 1778 a convict settlement was placed there. As prisoners' terms expired they remained and became farmers and artisans, where Sydney now stands.

BOTFLY, the common name of a class of flies that are very troublesome to stockmen. They are heavy-bodied, hairy insects, somewhat resembling bumblebees. The botfly which preys on horses and cows lays its eggs upon the hairs of the animal's flanks or legs, and the larvae, when hatched, are licked up by the tongue and taken into the mouth, stomach and intestines, causing much injury and suffering. The larvae of other species burrow inside the nostrils of stock, and there are some which live under the skin of the animals. Cattle which have lumps on their backs show the presence of botfly larvae. Kerosene injected into the spots will destroy the grubs.

BOTHNIA, *bahth' ni a*, GULF OF, a gulf forming the northern arm of the Baltic Sea, lying north of the Aland Islands and projecting between Finland on the east and Sweden on the west. Its length is 400 miles, its average width about 120 miles and its depth from 164 to 330 feet. There are numerous islands, and many small inlets along the shores, so navigation is rather difficult, although there are many good harbors. On account of the large number of mountain streams flowing into it, the waters are comparatively fresh. In winter the gulf freezes over. In 1918 the Aland Islands were captured by the Germans; the League of Nations awarded them to Finland.

BOTH'WELL, JAMES HEPBURN, Earl of (1536?-1578), known in Scottish history by his marriage to Mary Queen of Scots. It is believed that he was deeply concerned in the murder of Darnley, Mary's husband. He was charged with the crime and was tried, but, appearing with 4,000 followers, he was readily acquitted. He was then in high favor with the queen, and, with or without her consent, he seized her at Edinburgh, carried her a prisoner to Dunbar Castle and prevailed upon her to marry him after he had divorced

his own wife. A confederacy was formed against him, and in a short time Mary was a prisoner in Edinburgh. Meanwhile Bothwell had been forced to flee to Denmark, where he died. See MARY STUART.

BOTTICELLI, *bot te chel'le*, SANDRO (properly ALESSANDRO FILIPEPI) (C. 1444-1510), an Italian painter of the Florentine school. Working at first in the shop of the goldsmith Botticelli, from whom he takes his name, he showed such talent that he was removed to the studio of the distinguished painter, Fra Filippo Lippi. To the fire and passion of his master's style, he added a fine imaginativeness and delicacy of his own. His greatest works are his madonnas, which exhibit particularly his individuality and religious fervor (see MADONNA). There is a certain tender and pathetic expression in the faces of all his figures. Some of his other works are *The Triumph of Spring*, *Birth of Venus*, *The Nativity* and *The Adoration of the Magi*. Many of his pictures are found in the Pitti Palace, Florence, and in many other galleries in Europe, also in the Gardner Museum, Boston, and the Metropolitan Museum, New York. Several of his frescoes are in the Sistine Chapel, Rome. In his later years Botticelli became an ardent disciple of Savonarola, and is said to have neglected painting for the study of mystical theology.

BOTTLE, a vessel for holding liquids. At one end is a narrow neck with a small opening, which can be closed with a stopper. Most bottles are made of glass, but some are of earthenware. Before a glass bottle can be made, a metal mold, in two pieces, of the exact size and shape required, must be made from a wooden pattern. The mold is made by an expert workman. From that point onward all the work of bottle-making is done by intricate machinery, with only a machine tender in charge of operations. The glass is composed of sand, sodium carbonate (soda ash), sodium sulphate (salteake), and either limestone or burnt or slaked lime. The glass is melted in a furnace until it is liquid, and thence it is passed to the machines which form the bottles inside their molds, all the operations being induced by compressed air. A large machine can produce 8,000 bottles a day.

Before the advent of machines, bottles were all made by hand. The operator gathered molten glass on the end of a long tube, blew the glass into a pear-shaped mass, then

swung it into the open mold, after which the mold was closed. Then by blowing again with a strong pair of lungs the glass was forced into every crevice of the mold, so that every detail of pattern was assured. The mouth was later formed by softening the bottle in an oven and working it into shape with a special tool.

BOTTLE-TREE, the name applied to a tree which has a trunk resembling a bottle with bulging sides. There are several species. The Australian bottle-tree is the most common, having a short, bottle-like trunk and dense foliage.

BOUCICAULT, *boo'se ko*, DION (1822-1890), an Irish dramatic author and actor. He studied to become an architect, but the success of a comedy, the well-known *London Assurance*, which he wrote when only nineteen years old, started him on a career in connection with the stage. In 1852 he became an actor, and in 1853 he went to America, where he was scarcely less popular than in England. On his return in 1860 he produced a new "sensational" style of drama, of which *The Colleen Bawn* and *Arrah-na-Pogue* are the best examples. In collaboration with Joseph Jefferson he dramatized Irving's story of *Rip Van Winkle*, in which Jefferson became world-famous as an actor. As an actor Boucicault was clever, but not highly gifted. He wrote about 300 dramatic pieces.

BOUGHTON, *bou'ton*, GEORGE HENRY (1834-1905), an English-American artist who is widely known as a painter of colonial and Dutch life. He was taken to America from England when five years of age, and his first art studies were pursued in the United States. Later he had the advantages of European study and travel. Boughton's canvases have a realism that gives them great charm. He is best remembered as the painter of *Return of the Mayflower*, *Puritans Going to Church*, *The Scarlet Letter* and a number of admirable Dutch scenes.

BOUILLON, *boo yoN'*, GODFREY DE. See GODFREY DE BOUILLON.

BOULANGER, *boo lahN zha'*, GEORGES ERNEST JEAN MARIE (1837-1891), a French soldier who figured in a conspiracy to restore the monarchy. He served in Algeria, Italy and China, fought in the Franco-German War, and became brigadier-general in 1880. He was made minister of war in 1886, and in this capacity he was active in procuring the expulsion of the Orleans princes

from the army and from France. He successfully contested several seats in the Chamber of Deputies, and in 1889 was elected deputy for Paris by a very large vote. Two months later the government, claiming to have evidence of his intended treason, began a prosecution, and Boulanger fled to Brussels and thence to the Isle of Jersey. He was convicted in his absence and remained an exile. It was eventually shown that he was a tool in the hands of certain plotting Royalists. He committed suicide in Brussels in 1891.

BOULDER, *bole'dur*. In geology the word is applied to ice-worn and partially smoothed blocks of large size, lying on the surface of the soil, or embedded in clays and gravels. They generally differ in composition from the rocks in their vicinity, a fact which proves that they must have been transported from a distance, probably by ice. When lying on the surface, boulders are known as *erratic blocks*. The *boulder clay*, in which these blocks are found, belongs to the post-Tertiary or Quaternary Period. It occurs in many localities, consists of a compact clay often separated by thin beds of gravel and sand, and is believed to have been deposited from icebergs and glaciers in the last glacial period. See ERRATICS; GLACIERS; GLACIAL PERIOD.

BOULDER, COLO., founded in 1858, is the county seat of Boulder County, on the Union Pacific and the Colorado & Southern railroads, twenty-nine miles northwest of Denver, at the base of the Rocky Mountains. The city has mills for tungsten ore reduction, ore sampling works, a cutlery factory and brick and cement works. The state university is located here, and there is a business college, a Carnegie Library, and two sanitariums. Population, 1930, 11,223.

BOULDER DAM. A great dam on the Colorado River, between Arizona and Nevada, for irrigation and power development. See IRRIGATION.

BOULOGNE, *boo lo'ny'*, FRANCE, a seaport situated at the mouth of the Liane River and on the English Channel, twenty-two miles southwest of Calais and 139 miles northwest of Paris. It is called "Boulogne on the Sea" to distinguish it from a city of like name on the Seine. The city is divided into an upper and a lower town, the upper town being surrounded with spacious boulevards constructed on the ancient ramparts. The lower town is

the business section and is modern in its plan and structure. The important buildings are the castle, erected in 1231, the church of Notre Dame, the Hotel de Ville and the palace of justice. The city also contains public baths, a public library and a museum of natural history. The trade and the fisheries are very extensive.

Boulogne is one of the most important seaports of France and has daily steamer communication with England. The lower town has quite a large English population, and the English language is quite generally spoken. It is one of the oldest cities of France and still shows evidence of Roman occupation. It was captured by the Northmen in 882, and in 1544 it was taken by Henry VIII of England. It was destroyed by Charles V in 1553. It was here that Bonaparte gathered a large army for the purpose of invading England, but he never carried out his purpose. Louis Napoleon attempted to start an insurrection here in 1840, but he failed and was imprisoned in the castle. During the World War the city was one of the Channel ports which were threatened by the German invaders. Population, 1931, 51,854.

BOUNTY, in political economy, a reward or premium granted for the encouragement of a particular kind of employment or production, the idea being that the development of such trade or production will be of benefit to the whole community. The term is especially applied to the amount given for the destruction of noxious plants or animals. The same name is given to a premium offered by government to induce men to enlist in the public service, especially to the sum of money formerly given to recruits in the army and navy. In Canada an annual appropriation is made by the government to encourage the fishing industry; the money is distributed as a bounty to men engaged in the fisheries. Bounties have been paid in Canada at various times to stimulate the production of crude petroleum and of iron, steel and lead.

BOURBON, *boor'bon*, an ancient French family which has given three dynasties to Europe, the Bourbons of France, of Spain and of Naples. The first of the line known in history is Adhemar, who, at the beginning of the tenth century, was lord of the old province Bourbonnais. The power and possessions of the family increased steadily until, in 1272, Beatrix, daughter of Agnes of Bourbon and John of Burgundy, married Robert,

sixth son of Louis IX of France, and thus connected the Bourbons with the royal line of the Capets. Their son Louis had the barony converted into a dukedom and became the first duke of Bourbon.

Two branches took their origin from the two sons of this Louis. The elder line was that of the Dukes of Bourbon, which became extinct at the death of the Constable of Bourbon in 1527, in the assault of the city of Rome. The younger was that of the counts of La Marche, afterward Counts and Dukes of Vendôme. From these descended Anthony of Bourbon, Duke of Vendôme, who by marriage acquired the kingdom of Navarre, and whose son, Henry of Navarre, became Henry IV of France. Anthony's younger brother, Louis, Prince of Condé was the founder of the line of Condé. There were, therefore, two chief branches of the Bourbons—the royal and that of Condé.

The royal branch was divided by the two sons of Louis XIII, the elder of whom, Louis XIV, continued the chief branch, while Philip, the younger son, founded the House of Orleans. The kings of the *elder French royal line* of the House of Bourbon run as follows: Henry IV, Louis XIII, XIV, XV, XVI, XVII (who never obtained the crown), XVIII and Charles X. The last sovereigns of this line, Louis XVI, Louis XVIII and Charles X, were brothers, all of them being grandsons of Louis XV. Louis XVIII had no children, but Charles X had two sons, and it was the younger of these, who was the father of the count of Chambord, who was looked upon by his party as the legitimate heir to the crown of France.

The branch of the Bourbons known as the House of Orleans was raised to the throne of France by the Revolution of 1830, and was deprived of it by that of 1848. A regular succession of princes leads to the notorious *Egalité* Orleans, who in 1793 died on the scaffold, and whose son, Louis Philippe, was king of France from 1830 to the Revolution of 1848. It is a representative of this branch, Louis Philippe, Count of Paris, who is the present head of the family, uniting in himself the claims of both branches to the throne of France.

The Spanish Bourbon dynasty originated when, in 1700, Louis XIV placed his grandson Philip, Duke of Anjou, on the Spanish throne, as Philip V. From him is descended the former Alfonso XIII of Spain.

The royal line of Naples, or the Two Sicilies, took its rise when, in 1735, the younger son of Philip V of Spain obtained the crown of Sicily and Naples and reigned as Charles III. In 1759, however, he succeeded his brother Ferdinand VI on the Spanish throne, and at that time he transferred the Two Sicilies to his third son, on the condition that this crown should not be united with that of Spain. Ferdinand IV had to leave Naples in 1806; but after the fall of Napoleon he again became king of both Sicilies under the title of Ferdinand I, and the succession remained to his descendants until 1860, when Naples was incorporated into the new kingdom of Italy.

BOURGEOISIE, *boor zhwah zee'*, a name applied to a certain class in France, in contradistinction to the nobility and clergy, as well as to the working classes. It thus corresponds nearly with the English term, "middle classes." The term is now applied quite generally to the middle classes of other countries, and was used frequently in connection with the revolution which overthrew the Russian government headed by Kerensky (1917). The Bolsheviks, who gained control of affairs, made war on all members of the bourgeoisie, that is, on all classes between the nobility and peasantry, as well as on the upper classes. See **BOLSHEVIKI**.

BOURGET, *boor zha'*, PAUL (1852-), a French essayist and novelist who ranks with the foremost contemporary French writers. He was graduated at the Collège de Sainte-Barbe in Paris and then took up journalism. His first publication, with the exception of contributions to magazines, was a volume of verse called *Restless Life*. His *Studies and Portraits* and *Essays on Contemporary Psychology* show him to be a brilliant psychological analyst, and the same trait is manifested strongly in his novels. Among the latter are *The Disciple*, *Cruel Enigma* and *The Promised Land*. Bourget is at all times a realist, displaying a profound knowledge of human nature.

BOURINOT, *boo're no*, SIR JOHN GEORGE, (1837-1902), a Canadian historian and parliamentarian. After his graduation from Trinity College, Toronto, he established the *Halifax Reporter*, of which he was the editor for many years. His first historical and political papers, many of which were later expanded into books, appeared in the proceedings of the Royal Society of Canada. He

was the recognized authority on questions of parliamentary procedure and constitutional history. Among his best-known books are *Parliamentary Procedure and Practice*, *Manual of Constitutional History*, *Parliamentary Government in Canada*, *How Canada is Governed*, *Canada under British Rule* and *Canada's Intellectual Strength and Weakness*.

BOW, *bo*, one of the most ancient and widely-used weapons of offense. It is made of steel, wood, horn or other elastic substance. The curving bow is the typical form of this weapon, but the ancient Grecian bow was somewhat in the form of the letter Σ . In drawing it, the hand was brought back to the right breast, and not to the ear. The Scythian bow was nearly semicircular. The long-bow was the national weapon in England. The battles of Crécy (1346), Poitiers (1356) and Agincourt (1415) were won by this weapon, which was made of yew or ash. It was of the height of the archer, or about six feet long, the arrow usually half the length of the bow. Since the introduction of firearms the bow has gradually ceased to be used except for recreation. See **ARCHERY**.

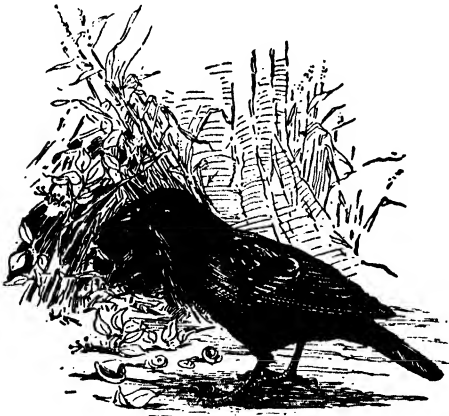
BOWDOIN *bo'd'n*, **COLLEGE**, the oldest institution of learning in Maine, chartered in 1794 and named after James Bowdoin, governor of Massachusetts, of which state Maine was then a district. Connected with Bowdoin College is the medical school of Maine, organized in 1820. The college is noted for the many eminent men who have graduated from it. Among others were Henry W. Longfellow, Franklin Pierce, Chief Justice Melville W. Fuller, Thomas B. Reed and Robert E. Peary. The college has about sixty instructors, over 580 students, a library containing about 158,000 volumes and buildings valued at nearly \$3,500,000.

James Bowdoin (1727-1790), for whom the college was named, was active in the patriot cause before and during the Revolution. In 1774 he was elected a member of the Continental Congress, in 1775 became president of the Massachusetts council and in 1779 presided over the state constitutional convention. In 1785 Bowdoin became governor of the state and proved his executive ability by his energetic measures in the suppression of Shays' Rebellion. He was later a member of the convention that framed the Federal Constitution. Bowdoin was one of the founders, and became the president, of the American Academy of Arts and

Sciences, and he was also a founder of the Massachusetts Humane Society.

BOWELL, SIR MACKENZIE, (1823-1917), a Canadian statesman, born at Rickingham, Suffolk, England, and educated at the Belleville (Ontario) public schools. At the age of eleven he entered the office of the Belleville *Intelligencer*, of which he later became editor and proprietor. He was elected to the House of Commons as a Conservative in 1867 and served continuously till he was called to the Senate in 1893. In 1878 he entered the cabinet of Sir John Macdonald as minister of customs; he was minister of militia under Sir John Abbott, and later, as minister of trade and commerce, he was instrumental in securing the Pacific Cable to Australia. In December, 1894, he became Premier, but resigned in April, 1896. Until 1906 he was leader of the opposition in the Senate. Sir Mackenzie took an early interest in the militia and in 1857 assisted in raising a rifle company. He was in active service on the frontier during the American Civil War and in the Fenian troubles in 1866, retiring with the rank of Colonel.

BOWER-BIRD, a name given to several different birds living in Australia or the Pacific islands. They are so called because in the nesting season they build remarkable bowers to serve as places of resort. These are constructed on the ground, usually under



BOWER-BIRD

overhanging branches in secluded parts of the forest. Here the male birds meet and dance and go through the queer antics that are supposed to attract their mates. One species uses only small shells for decora-

tion; another bird builds a tentlike structure around a sapling, using for rafters the stems of an orchid that continues to blossom after it is picked; still another uses only feathers. This fondness for bright things is not confined to the bower-birds, though no other birds seem to possess it to so great a degree. The magpie may be mentioned as an American illustration of this trait.



BOWLING, a modern development of an old English game, played indoors, and especially popular during the cool months of the year. The game is played on a long, level and very smooth "alley" made of boards stood on edge. The alley is forty-two inches wide, with a narrow gutter on each side to receive balls inaccurately rolled, and sixty feet long. There is a runway for players at one end and a depression

at the other end, to receive spent balls and pins which are knocked down. One attendant is necessary on each alley, to reset the pins and return the balls on a slanting roadway to the players.

Besides the alley there are ten wooden pins fifteen inches high, with bases two and one-fourth inches in diameter. Each pin weighs three pounds two ounces. The pins are set at the lower end of the alley, twelve inches apart, as shown on page 534.

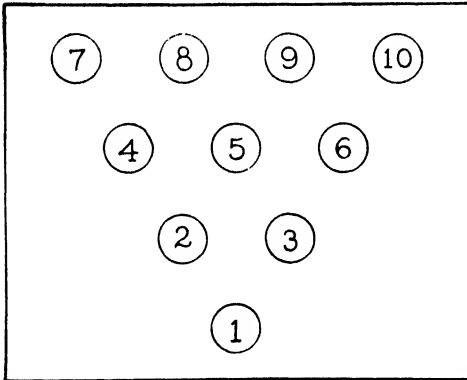
The balls are of various weights, and must be perfectly round. They are made of wood, preferably of lignum-vitæ, or of a durable composition. The regulation ball weighs sixteen pounds; for young players and for many women balls averaging eight to twelve pounds are popular. Each ball has either two or three thumb and finger holes, with which to manipulate it.

The object of the game is to knock down the pins by rolling the ball along the alley. Each player may roll two balls and must then give way to an opponent. Each of these innings is called a *frame*. If a player knocks down all the pins with a single ball, it is known as a *strike*; if he knocks them all down with the two balls, it is known as a *spare*. The count is reckoned on the number of pins knocked down in ten innings or

NAME	1	2	3	4	5	6	7	8	9	10	ST.	SP.	TOTAL
John	8	9	7	7	9	9	X	9	X	8			122
Jim	9	X	X	7	9	X	X	9	X	7			139
Joe	X	X	9	X	8	X	X	8	X	7			153
	29	48	57	75	83	103	121	129	146	153			

frames. The side having knocked down the most pins, wins.

The method of scoring is not difficult to understand. If neither a strike nor a spare is achieved, the number representing pins tumbled is added to the preceding total. If a strike is made, no immediate addition is made to the score; 10 points (number of pins tumbled) are reserved, for the number of pins tumbled by the two balls thrown in the next frame is added to this 10; if a spare results in any frame, the 10 points are reserved and added to the number knocked down in the first throw in the succeeding frame. If two strikes occur in a row, 10 points become reserved in the first, and in the second 10 points plus the pins tumbled in the next throw; if two spares occur successively, 10 points are added to the result



RELATIVE POSITION OF PINS

from the next throw. The diagram can be analyzed from the above brief explanation; single marks indicate spares; crosses are for strikes. Three hundred is the highest possible score.

Bowling was derived from the ancient English game of bowls, played on a level grassy plot. The playing ground was 120 feet long. The players rolled balls along the grassed

alley and attempted to place them as near as possible to a large wooden pin at the farther end. With modifications this game is still very popular. It will be remembered that in the fanciful story of *Rip Van Winkle* Rip came upon bowlers in a level space in the mountains. They were engaged in this ancient pastime.

BOX-EL'DER, the ash-leaved maple, a small but beautiful tree of the United States. The tree grows rapidly almost anywhere, and accordingly it is a favorite shade tree. The wood is soft and brittle, but is used in making bowls, pails and wood pulp, and as a fuel.

BOXER REBELLION, an outbreak in China in 1901 against foreigners. After the Chino-Japanese War of 1894-1895 the European powers secured for themselves so many commercial and territorial concessions that a large number of Chinese began to fear that the nation would lose its independence. Feeling against the foreigners grew steadily, and by 1900 much was heard of the Boxer organization, a body of volunteer Chinese soldiers. *Boxer* was an incorrect translation of the Chinese name of the organization.

Matters came to a climax in June, 1901, when Pekin was in the hands of a mob, and the foreign diplomats and a few missionaries and their families were besieged in the British legation. An allied army of 18,000 was finally organized, and on August 14 Pekin was entered.

China was severely punished. Besides agreeing to crush the anti-foreign movement, the government agreed to pay an indemnity of \$330,000,000 to the allies. During President Roosevelt's administration the United States remitted half of its share of the indemnity, and asked that the money be used to pay the expenses of a number of Chinese students in American colleges.

BOXING, an art which consists in dealing blows with the fists against an opponent, and in protecting the body, with hands and

arms, against the opponent's blows. It is classed among athletic contests, but rightfully so only when indulged in by amateurs who use soft gloves. When hard gloves are used and a contest continues until one contender is unable to rise from the floor the so-called sport is known as prize-fighting.

Gloves thickly padded over the back of the hand, the fingers and the thumb, so as to give the appearance of a very thick mitt, are used in boxing. The leather is soft and pliable, and the gloves used by amateurs are so soft that injury is rarely inflicted by the blows. A boxing match usually consists of a specified number of rounds, each lasting three minutes, with an intermission of one minute between rounds. If at any time (except during the last ten seconds of a round) a boxer is knocked down, he is allowed ten seconds in which to get on his feet unassisted. If he fails, he is "counted out" and loses the match. The competitions take place in a *ring*, which is an oblong about 16 by 24 feet, surrounded by two ropes, which make a fence 4 feet high. The regulation athletic costume is used in boxing matches. Boxers are classified according to their weights, the numbers given here being the maximum limit: Flyweight, 112 pounds; bantamweight, 118 pounds; featherweight, 126 pounds; lightweight, 135 pounds; welterweight, 147 pounds; middleweight, 160 pounds; light heavyweight, 175 pounds; heavyweight, over 175 pounds.

Boxing with soft gloves and in the friendliest spirit, is endorsed by directors of athletics as a healthful and useful recreation. It teaches alertness and agility, and the art of self-defense. Rules governing the sport may be obtained in athletic goods' stores.

Professional heavy-weight boxing, or prize-fighting, is referred to in the article Prize-Fighting.

BOXING THE COMPASS, in seaman's phrase, is the ability to repeat the names of all the points of the compass in their proper order—an accomplishment required of all sailors. That the compass on a ship is kept in a box may be the explanation of the origin of the term. See COMPASS.

BOX TORTOISE, *tor'tis*, or **BOX TURTLE**, a name given to those North American tortoises or turtles that can completely shut themselves into their shell, which can be closed by hinged joints in the lower shell. They are land animals, and feed chiefly on

berries and mushrooms. It is the shell of a species of sea tortoise that furnishes the valuable tortoise shell.

BOX TREE, a shrubby evergreen tree twelve or fifteen feet high, with small oval and opposite leaves, and greenish, inconspicuous flowers, male and female on the same tree. It is a native of England, Southern Europe and parts of Asia, and was formerly so common in England as to have given its name to several places—Boxhill, in Surrey, for instance, and Boxley, in Kent. The wood is of a yellowish color, close-grained, very hard and heavy, and takes a beautiful polish. Therefore it is much used by turners, wood carvers, engravers on wood and mathematical instrument makers. Flutes and other wind instruments are made from it. The boxwood of commerce comes mostly from the regions adjoining the Black and Caspian seas, and is said to be diminishing in quantity. In gardens and shrubberies box trees may often be seen clipped into various formal shapes. There is also a dwarf variety reared as a hedge for garden walks.

BOYCOTTING, the name given to an organized system of injuring a person's business by ignoring him. It was first employed in connection with the Land League and agitation of 1880 and 1881 in Ireland, and took its name from Captain James Boycott, a Mayo agent, against whom it was first put in force. Persons who are subjected to boycotting find it difficult or impossible to get any one to work for them, to supply them with the necessities of life or to associate with them in any way. Union labor has at times used the boycott to secure higher wages and other demands, but this form of coercion is expressly forbidden by law in most states of the Union.

BOYLE'S LAW, sometimes called **MAROTTE'S LAW**, is a law in physics, to the effect that the volume of a gas at a constant temperature will vary inversely as the pressure to which it is subjected. A given volume of gas under a pressure of two pounds to the square inch will occupy twice the space it will under a pressure of four pounds to the square inch.

BOYNE, BATTLE OF THE, a battle in which the army of William III of England defeated the forces of James II. It was fought in 1690, and decided for more than two centuries England's supremacy in Ireland. The

Boyne is a small river in Eastern Ireland, about thirty miles north of Dublin.

BOYS' AND GIRLS' 4-H CLUBS, organizations perfected throughout rural America for the education and development of the youth along lines of agriculture and home economics. As far back as the closing years of the nineteenth century a few progressive county school superintendents in the agricultural states of the Middle West began to interest themselves in club work for boys and girls, and later the state agricultural colleges extended aid to the movement. As no funds were appropriated for systematic development of club activities, it was not until the United States Department of Agriculture took hold of the work, in 1908, that satisfactory progress was made. Since that time annual appropriations support the work and pay trained organizers and directors. Though there are boys' and girls' clubs for many purposes, the government is sponsor for only one such enterprise, which has been named the 4-H Clubs. The emblem of these clubs is the four-leaved clover, with an *H* on each leaf; the four *H*'s signify the development of the Head, Heart, Hands and Health of its members. Membership is voluntary, and the only promise exacted is that each member shall strive, under official leadership, to learn and be able to demonstrate better practices in agriculture or home economics than he or she had known before.

The Scope and Purpose of Club Work. The work accomplished by the boys' and girls' club is of a practical nature. The young people learn by doing, and they have results to show for their labor. They engage in corn-growing, gardening, poultry and hog raising, canning and preserving, and the girls take up, in addition, sewing, cooking and home management. The work is all carefully systematized and accurate records are kept of whatever is attempted. The club members engaged in any enterprise know just how much has been expended, and exactly what the profits are at the end of the season. Field meetings, demonstrations, exhibitions at fairs, contests, etc., are important features of club work, and the interest manifested in these public exhibitions of club activity is growing yearly.

The objects of this work are to give young people in agricultural communities proper instruction in farm work and home economics, to give them training in leadership,

to encourage initiative and develop executive ability, to advance the social life of the community and strengthen the idea of coöperation between individuals and families, and to inculcate habits of thrift, economy and industry. It is believed that by means of club activities the importance of agriculture in the life of the nation is emphasized, and that the interest taken by young people in the farm and its manifold activities will be a source of strength to every part of the country for years to come.

The work is under the direction of the Extension Service of the Agricultural Colleges. A state leader or agent directs the work with the assistance of specialists, county agricultural agents, home demonstration agents, and boys' and girls' club agents. Information regarding these clubs may be secured from the Director of Extension at the state agricultural college, or the office of Coöperative Extensions, U. S. Department of Agriculture, Washington, D. C.



B OY SCOUTS OF AMERICA.

This is a movement to train boys to be good citizens through a program of the things they like best to do. Boy Scouts are an outdoor crowd. They learn camping, hiking, swimming, fire-building, cooking, map-making, signaling, pioneering, how to use a knife and axe, tree planting, nature study and many other things. They are useful citizens, also, and help the

fire department, the police, Forestry Bureau, Red Cross, and take part in all kinds of civic service.

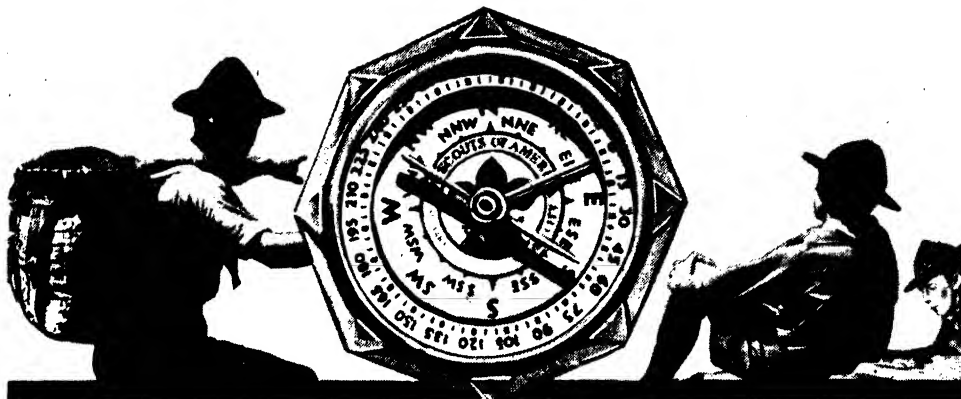
Scout associations are organized in more than 70 countries throughout the world. There are over 950,000 Boy Scouts in the United States, and more than 2,000,000 in the world. The Boy Scouts of America was incorporated in 1910 and in 1916 was chartered by Congress. It is neither military nor anti-military, and is entirely non-sectarian. Most scout troops are organized through churches, schools, men's clubs, and the American Legion and community houses also act as sponsors. Any boy who is 12 years old may become a scout. Eight or fewer make a patrol. A troop is composed of four



NO IDLE HANDS IN A BOY SCOUT CAMP

The boys play as well as work, and work is so interesting that it is play! Above, the lads compete in fire-building; they signal by flag codes; they learn to cook: they erect their tents.

[See over.]



THE SCOUT LAW

"Duty to God" and "Duty to Country"

1. "A SCOUT IS TRUSTWORTHY"

A scout's honor is to be trusted. If he were to violate his honor by telling a lie, or by cheating, or by not doing exactly a given task, when trusted on his honor, he may be directed to hand over his Scout badge.

2. "A SCOUT IS LOYAL"

He is loyal to all to whom loyalty is due; to his Scout leader, his home, and parents, and country.

3. "A SCOUT IS HELPFUL"

He must be prepared at any time to save life, help injured persons, and share the home duties. He must do at least one good turn to somebody every day.

"Duty to Country" and "Duty to Others"

4. "A SCOUT IS FRIENDLY"

He is a friend to all, and a brother to every other Scout.

5. "A SCOUT IS COURTEOUS"

He is polite to all, especially to women, children, old people, and the weak, and helpless. He must not take pay for being helpful or courteous.

6. "A SCOUT IS KIND"

He is a friend to animals. He will not kill or hurt any living creature needlessly, but will strive to save and protect all harmless life.

"Duty to Others" and "Duty to Self"

7. "A SCOUT IS OBEDIENT"

He obeys his parents, Scoutmaster, patrol leader, and all other duly constituted authorities.

8. "A SCOUT IS CHEERFUL"

He smiles whenever he can. His obedience to orders is prompt and cheery. He never shirks nor grumbles at hardships.

9. "A SCOUT IS THRIFTY"

He does not wantonly destroy property. He works faithfully, wastes nothing, and makes the best use of his opportunities. He saves his money, so that he may pay his own way, be generous to those in need, and helpful to worthy objects. He may work for pay, but must not receive tips for courtesies or good turns.

"Duty to Self" and "Duty to God"

10. "A SCOUT IS BRAVE"

He has the courage to face danger in spite of fear, and to stand up for the right against the coaxings of friends or the jeers or threats of enemies, and defeat does not down him.

11. "A SCOUT IS CLEAN"

He keeps clean in body and thought, stands for clean speech, clean sport, clean habits, and he travels with a clean crowd.

12. "A SCOUT IS REVERENT"

He is reverent toward God. He is faithful in his religious duties, and he respects the convictions of others in matters of custom and religion.

patrols, or less. The maximum is 32 boys. Each patrol has a boy leader, but the leader of the troop is a scoutmaster, an American citizen, who has reached the age of at least 21 years.

Boy Scouts have a handclasp that only scouts may use. Their motto is "Be Prepared." Every scout subscribes to the twelve Scout Laws and the Scout Oath. The Scout Oath reads: "On my honor, I will do my best: 1. To do my duty to God, and my country, and to obey the Scout Law. 2. To help other people at all times. 3. To keep myself physically strong, mentally awake and morally straight."

Tenderfoot is the lowest rank. Then as he learns more scoutcraft, the scout progresses from second to first class rank until finally he becomes an eagle, the highest rank in Scouting. Boy Scouts have a chance to learn a good trade as a hobby through the merit badge plan. Merit badges are given for proficiency in some 70 subjects, and count towards higher scout rank.

The watchword of the Scout movement is service; each Scout is expected to "Do a good turn daily," either in a private way or in mass efforts for the good of the community. In towns the Scouts are organized in troops, but there are provisions whereby boys isolated in rural sections may become Lone Scouts, and may be grouped in farm patrols. Full particulars respecting all phases of Scoutcraft may be had from headquarters at 2 Park Avenue, New York City.

Credit for founding the movement is given to General Sir Robert Baden-Powell of England, who began the organization of troops in 1908. An American traveler in England, recipient of a "good turn" by a Scout, brought the idea of Scoutcraft across the Atlantic in 1909. Soon several organizations of similar nature were merged with the Scouts. For signal code, see SIGNALING.

BOZZARIS, *bo'tsah ris*, MARCO (1788-1823), a Greek hero of the War of Independence, who distinguished himself by his patriotism and military skill. He was killed in a night attack upon the camp of the Pasha of Scutari. The incident gave rise to the poem *Marco Bozzaris* by Fitz-Greene Halleck. In this poem these lines occur:

Bozzaris! with the storied brave
Greece nurtured in her glory's time,
Rest thee; there is no prouder grave,
Even in her own proud clime.

• • • • •

For thou art freedom's now, and fame's,—
One of the few, the immortal names
That were not born to die.

BRABANT, *brah'bant*, the central district of the lowlands of Holland and Belgium, extending from the Waal to the sources of the Dyle, and from the Meuse and the plain of Limburg to the lower Scheldt. This territory now comprises the Dutch province of North Brabant, and the southern part of the Belgian provinces of Brabant and Antwerp. In the time of Caesar, Brabant was inhabited by a mixed race of Germans and Celts, but in the fifth century the Franks took possession of it. Later it became a part of the Duchy of Lorraine. The principality of Brabant grew up around the city of Louvain. In 1430 Brabant came under the rule of the House of Burgundy and later passed to the Hapsburgs. The northern part of Brabant took part in a revolt of the Netherlands against Philip II of Spain and became a part of the Dutch Republic. After the wars of Napoleon all of Brabant was included in the kingdom of the Netherlands and was divided into three provinces, but the present Belgian portion became a part of Belgium in 1830. Duke of Brabant is the title of the eldest son of the Belgian king. See BELGIUM; WORLD WAR.

BRADDOCK, EDWARD (1698-1755), a British soldier, remembered chiefly as the leader of the Fort Duquesne expedition, in which George Washington also took part. In 1754, at the outbreak of the French and Indian War, Braddock was made commander of all British troops in America. He arrived at Hampton, Va., in 1755, and near Alexandria met the Virginia troops for the expedition against the French Fort Duquesne. By April 24 he had reached Frederick, Md., when he was forced to wait for wagons to transport his stores. He was joined there by Washington, whom he invited to be his aid-de-camp, and Benjamin Franklin, then postmaster-general of the colonies. He scorned the advice of Franklin regarding the danger from the ambuscades of the Indians, and set out from Fort Cumberland by the path marked out by Washington two years earlier. The army consisted of about 1,200 regulars and provincials and a few friendly Indians.

On July 9 the advance division under Gates was attacked by a band of French and Indians. Frightened by the warwhoop which

they heard for the first time, the British fell back in confusion, and Braddock tried to rally them against their invisible foes. Familiar with Indian warfare, the Virginians separated, and sought shelter behind rocks and trees, but Braddock, dispensing with the "military instruction of a Virginia colonel," Washington, kept his men drawn up in platoons, and they fired at random into the forest, killing many of the Americans. Braddock's personal bravery was conspicuous. Five horses were killed under him, and he was at last mortally wounded. The battle ended in a rout, and less than half of the force survived and was led to safety by Washington. See FRENCH AND INDIAN WARS.

BRADDOCK, PA., founded in 1795 on the site of General Braddock's defeat in 1755, is a manufacturing city in Allegheny County, ten miles east of Pittsburgh. It is on the Pennsylvania, the Baltimore & Ohio and Lake Erie railroads, and on the Monongahela River. The industries center largely in steel, wire, pig iron, cement and plaster. The city has a Carnegie Library, a hospital, one park, and two playgrounds. Population, 1930, 19,329.

BRADFORD, ENGLAND, an industrial city in Yorkshire, situated on a tributary of the Aire, eight miles west of Leeds. Bradford is in a vicinity of rich coal and iron mines, and is a prosperous center of woolen and cotton manufacture. In the worsted mills alone, 36,000 persons are employed in normal times. The city has good streets and modern buildings, and is thoroughly up to date in matters of government. It has a number of public parks and is noted for its excellent public utilities, including the water, gas and electric light works, which are owned by the municipality. The most important structures are the town hall, Saint George's Hall, Mechanics' Hall, the exchange and the temperance hall. The city contains a technical college, a free public library and numerous other educational institutions. There are also an infirmary, an eye and ear hospital, an institution for the blind and several almshouses. Population, 1931, 298,041.

BRADFORD, PA., founded in 1823, is a city in McKean County, seventy-eight miles south of Buffalo, N. Y., on a tributary of the Allegheny River, and on the Pennsylvania, Erie, and Baltimore & Ohio railroads. There is an airport. It lies in a productive oil

field and in a natural-gas region, and has oil refineries, gasoline manufactories, tool shops, boiler and gas engine works, extensive lumber interests and wood-working establishments. The mayor and council form of government is in operation, the former commission form having been abandoned. Fourteen miles away is the great Kinzua bridge, 300 feet high and 2,100 feet long. Population, 1920, 15,526; in 1930, 19,306.

BRADFORD, WILLIAM (about 1590-1657), a colonial statesman in America, second governor of Plymouth colony and the chief historian of that colony and period. He was born in Yorkshire, England, and joined the Separatist Church at Scrooby, but was imprisoned when that congregation went to Holland in 1608. Later he joined his friends at Leyden and became a prominent member of the community there. He went to America on the *Mayflower*, and upon the death of Carver he became governor of the colony, holding the office continuously until his death, with the exception of a period of five years. During all this time he was the responsible head of the colony and administered its affairs with remarkable foresight and sagacity.

Bradford's *History of Plymouth Plantation*, which is the foundation for all later accounts of the period, was left by the author in manuscript form. During the Revolution it disappeared, but in 1855 it was discovered in England in the library of Fulham. On being returned to America this valuable work was published; the original manuscript is now preserved in the Massachusetts archives.

BRADLEY, JOSEPH PHILO (1813-1892), an American jurist, one of the most distinguished constitutional lawyers of his time. He was born at Berne, N. Y., educated at Rutgers College, and admitted to the bar in 1839. Bradley attained prominence in his profession and was a Republican elector in the Fremont campaign of 1856. In 1870 he was appointed Associate Justice of the Supreme Court, and in 1876 he was a member of the electoral commission which decided the Presidential election in favor of Hayes. See ELECTORAL COMMISSION.

BRADSTREET, ANNE (1612-1672), an American poet, remembered to-day solely because hers is one of the first names in American literature. She was a daughter

of Thomas Dudley, the second governor of Massachusetts colony, and was married to Governor Simon Bradstreet in 1628. Her poetry consisted chiefly of discourses on the history and phenomena of the universe. Modern readers find little of interest in her poems, but they were exceedingly popular when they first appeared, and Mrs. Bradstreet was given the name of "The Tenth Muse."

BRADY, CYRUS TOWNSEND (1861-1920), an American clergyman and author, who has written many popular stories of the masculine, warlike type. He was born in Allegheny, Pa. After graduating from the United States Naval Academy he resigned from service, worked with two western railroads, and after studying theology, was an Episcopal rector. Later he became archdeacon of Kansas, then of Pennsylvania, and successively rector of churches in Philadelphia, Toledo, Ohio, and Kansas City, Mo. He was a chaplain in the Spanish-American War. Brady's writings include *Recollections of a Missionary in the Great West*, lives of Decatur and Paul Jones, *Under Tops'ls and Tents*, *On the Old Kearsarge*, *The Island of Regeneration*, *The Cliff-Dweller's Pot*, *Bob Dashaway*, *The Fetters of Freedom*, *Briton of the 7th*, *The Eagle of the Empire*, *The Island of Surprise*, *Web of Steel* (1916), *When the Sun Stood Still* (1917), and *Waif-o'-the-Sea* (1918).

BRAGG, BRAXTON (1817-1876), a noted Confederate general was born in North Carolina. He was graduated at West Point in 1837, was appointed second lieutenant of the third artillery and served against the Seminoles in Florida. For gallant service in the Mexican War he was brevetted captain major and lieutenant-colonel. In 1856 he resigned from the Army and engaged in planting in Louisiana, and at the beginning of the Civil War he was appointed brigadier-general in the Confederate army and placed in command at Pensacola, Fla. In 1862 he became major-general in command of the second division of the Confederate army, and he held a prominent command at the Battle of Shiloh. After the evacuation of Corinth he succeeded General Beauregard in command of the army in the west. He was defeated at Perryville and at Murfreesboro, but was successful at Chickamauga. General Grant defeated him at Chattanooga, and in December of that

year Bragg was relieved from command at his own request. He was later called to Richmond to act as military adviser to President Davis, with whom he was a favorite.

BRAHE, *brah*, or *brah'ay*, TYCHO (1546-1601), a Danish astronomer, the instructor of Kepler and one of the greatest scientists of his time. With Brahe began the period of accuracy in astronomical calculations, and undoubtedly Kepler's achievements were due in large part to Brahe's teachings. He was born at Knutstorp. From early life he manifested an interest in the study of the heavens, and though destined by his uncle for the law he devoted most of his time to astronomical observations. In 1572 he discovered a new star in the constellation Cassiopeia. Later he was offered by Frederick II of Denmark an island on which to establish an observatory, besides the necessary funds for its erection and equipment and ample salary for its care. He accepted the proposition and erected the observatory, where for over twenty years he continued his observations, testing and improving old theories and bringing to light many new ones. After the death of Frederick II Brahe was so persecuted that he left the country, but he continued his astronomical work elsewhere until his death.

BRAH'MA, a Sanskrit word signifying (in its neuter form) the Universal Power, or the ground of all existence, not an individual deity, but only an object of contemplation, a universal spirit of which the human soul is a part. It is also (in its masculine form, with long final syllable) the name of the first person in the Triad (Brahma, Vishnu and Siva) of the Hindus. The personal Brahma is presented as a red or golden-colored figure, with four heads and as many arms, often accompanied by the swan or goose. He is the god of the Fates, master of life and death, yet he is himself created, being merely the agent of Brahma, the Universal Power. Brahma is not worshiped by the common people, and there is only one temple sacred to him.

BRAH'MANISM, a religious and social system prevalent among the Hindus, and so called because developed and expounded by the priestly caste known as the Brahmins. It is founded on the ancient religious writings known as the Vedas, which are regarded as sacred revelations. The Brahmins as a body

became custodians and interpreters of these writings, and the priests and general directors of sacrifices and religious rites. As the priestly caste increased in numbers and power, they made the ceremonies more elaborate and added to the Vedas other writings. In time the caste of Brahmins came to be accepted as a divine institution, and an elaborate system of rules was made which defined and enforced its place by the severest penalties, as well as that of the inferior castes, the Kshatriyas, or warriors, the Vaisyas, or cultivators, and the Sudras, or slaves. It was not without a struggle that the warriors recognized the superiority of the Brahmins. It was by the Brahmins that the Sanskrit literature was developed; and they were not only the priests, theologians and philosophers, but also the poets, men of science, lawgivers, administrators and statesmen of the Aryans of India.

The sanctity and inviolability of a Brahmin are maintained by severe penalties. Murdering or robbing one of the order are sins for which there is no atonement; even the killing of his cow can only be expiated by a painful penance. A Brahmin should pass through four states: first, as Brahmachari, or novice, he begins the study of the sacred Vedas, and is initiated into the privileges and the duties of his caste. He has a right to alms, to exemption from taxes and from capital and even corporal punishment. He is not allowed to eat flesh and eggs and must not touch leather, skins of animals and most animals themselves. When manhood comes he ought to marry, and, as Grihastha, enter the second state, which requires more numerous and minute observances. When he has begotten a son and trained him up for the holy calling, when he sees the son of his son, he ought to enter the third state, and as Vanaprastha, or inhabitant of the forest, retire from the world for solitary praying and meditation, with severe penances to purify the spirit; but this and the fourth or last state of a Sannyasi, requiring a cruel degree of asceticism, are now seldom reached, and the whole scheme is to be regarded as representing rather the Brahminical ideal of life than the actual facts.

The oldest Vedic literature represents a worship of natural objects; the sky, personified in the god Indra; the dawn, in Ushas; the various attributes of the sun, in Vishnu, Surya and Agni. These gods were asked for

assistance in the common affairs of life and were pleased by offerings which, at first few and simple, afterward became more complicated and included animal sacrifices. In the later Vedic hymns a philosophical idea of religion and of the problems of being and creation appears struggling into existence; and this tendency is systematically developed by the supplements and commentaries known as the Brahmins and the Upanishads. In some of the Upanishads the deities of the old Vedic creed are treated as symbolical. Brahma, the supreme soul, is the only reality, the world is regarded as coming from him, and the highest good of the soul is to become united with the divine. The necessity for the purification of the soul for its reunion with the divine nature gave rise to the doctrine of transmigration of souls.

From this philosophical development of Brahmanism came a distinct separation between the educated and vulgar creeds. While from the fifth to the first century B. C. the higher thinkers among the Brahmins were developing a philosophy which recognized that there was but one god, the popular creed had concentrated its ideas of worship round three great deities—Brahma, Vishnu and Siva, who now took the place of the confused old Vedic Pantheon. Brahma, the creator, though considered the most exalted of the three, was too abstract an idea to become a popular god, and soon sank almost out of notice. Thus the Brahmins became divided in allegiance between Vishnu, the preserver, and Siva, the destroyer and reproducer, and the worshippers of these two deities now form the two great religious sects of India. Siva, in his philosophical significance, is the deity mostly worshiped by the real Brahmin, while in his aspect of the destroyer, or in one of his female manifestations, he is the god of the low castes and is often worshiped with degrading rites. But the highly cultivated Brahmin is still a pure theist, and the educated Hindu in general professes to regard the special deity he chooses for worship as merely a form under which the One First Cause may be approached.

BRAHMAPUTRA, *brah ma poo't'ra*, a large river of Asia, rising in Tibet, flowing southward through the Himalayan Mountains and then westward into India, where it unites with the Ganges about ninety miles above its mouth. The sources of the Brahmaputra are not well known, but they are

in mountain regions over 16,000 feet above the sea. In the first part of its course the stream is called the Sanpo, and after it passes through the mountains it is known as the Dihong. It is then joined by the Dibong and Lohit, after which the united streams are known as the Brahmaputra. Its entire length is about 1,800 miles, and it is navigable for 800 miles from the sea. It flows through a fertile valley planted to rice, tea and jute, and is remarkable in that it has no bridges; travelers cross by boat or raft.

BRAHMS, JOHANNES (1833-1897), a German musical composer whose compositions are noted for their high intellectual quality. Brahms' music is generally conceded to be difficult to understand, and the composer has never appealed to the popular taste. He ranks, however, with the greatest masters of all time. The father of Brahms, who played the double bass in a Hamburg orchestra, gave his son a good musical education, and by the time the lad was twenty he was acclaimed a genius by Schumann, who had heard him play a number of original compositions. His work includes symphonies, serenades, concertos, songs and other compositions, but his masterpiece is the majestic *German Requiem*. The latter part of his life was spent in Vienna, after he had appeared in most of the music centers of Germany.

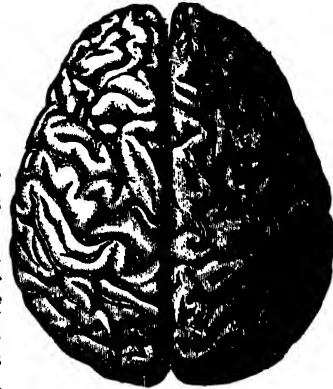
BRAILLE. See BLINDNESS.

BRAIN, the center of the nervous system in man and the higher animals. The human brain is the seat of the mind and the source of all that mankind has achieved. No great invention was ever perfected, no great picture was ever painted, no great book was ever written, that was not first produced in the brain of a human being. "Out of it are the issues of life." The quality of a man's brain determines in large measure what his life shall be. Scientists have studied this wonderful organ, and have named its parts and identified the materials of which it is made. Beyond this they cannot go. How the brain mechanism creates man's thoughts, intellect, soul—call it what you may—is an unsolvable mystery.

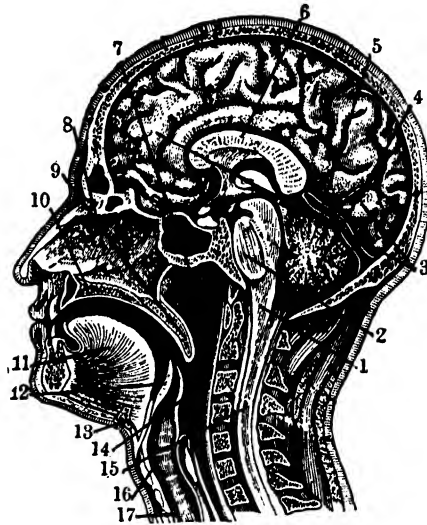
Though there are exceptions to the rule, the quality of the brain generally varies directly in proportion to the weight. The human brain is larger and heavier, not only in proportion to the weight of the body, but in actual mass, than that of any other animal

except the elephant and some species of whales. The brain of the average adult male weighs about three pounds, and that of the average woman is a little less, because her body is smaller. Idiots and the lower races of mankind, such as savages, have brains

proportionately lighter; an idiot's brain weighing only eight and one-half ounces has been noted. On the other hand, the brain of



BRAIN, FROM ABOVE



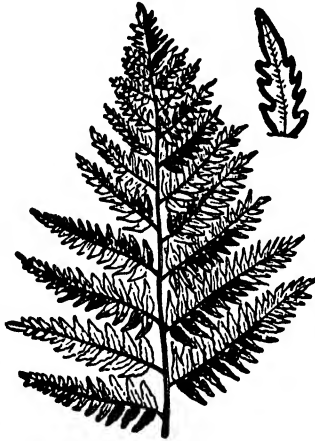
SECTION THROUGH HEAD AND NECK

1, medulla oblongata; 2, pons; 3, right lobe of cerebrum; 4, cerebellum in section; 5, blood vessel; 6, corpus striatum; 7, nasal passage; 8, nasal bone; 9, soft palate; 10, hard palate; 11, tongue; 12, epiglottis; 13, os hyoides; 14, esophagus; 15, spinal cord; 16, larynx; 17, windpipe.

Cuvier, the great French naturalist, weighed sixty-four ounces.

The human brain is composed of the *cerebrum*, *cerebellum*, *pons variolii* and *medulla oblongata*. These and other important parts are shown in the cut. This organ is covered

with a delicate membrane, the *pia mater*, which carries the blood vessels that supply the brain with blood. Lining the skull is a tough membrane, the *dura mater*, which extends downward into the fissure that separates the hemispheres of the cerebrum and forms a partition between the cerebrum and cerebellum. The arachnoid membrane lies be-



BRAKE

tween the other two; it receives its name from its delicate structure, likened to a cobweb. The substance of the brain is gray and white tissue. The gray tissue forms an outside layer of the cerebrum and cerebellum, which in this respect differ from the medulla oblongata and the *spinal cord*, and it forms a covering for the white substance into which it dips in the convolutions that increase its surface. It varies in thickness from one-twelfth to one-eighth of an inch.

Related Articles. Consult the following titles for additional information:
 Cerebrum Nervous System
 Cerebellum Psychology
 Medulla Oblongata Spinal Cord

BRAKE, a device for stopping or retarding the motion of a vehicle by pressure against the wheels. The shoe-brake is typical; it is a wooden or metal block that is pressed by a lever against the rims of wheels of horse-drawn vehicles, now rapidly disappearing. Railroad cars apply air brakes on trains (see **AIR BRAKE**), but each car is equipped with a shoe-brake, used when it is detached for switching.

Automobiles are equipped with two sets of flexible band brakes which fit around rims attached to the four wheels; for usual service one set of brakes contract and press downward upon the rims; emergency brakes expand outward against the rims. Latest model airplanes have wind resistance brakes set into the wings, in addition to brakes on landing gears. See illustration, **AIRPLANE**.

BRAKE, or **BRACKEN**, a species of fern very common in America and Europe generally, and often covering large areas on hillsides and on untilled grounds. It has a black creeping rootstalk, from which fronds grow often to the height of several feet and divide into three branches. As the plants remain erect in winter, they form a good cover for game throughout the year. The rootstock is bitter, but it has been eaten in times of famine, and used in brewing as a substitute for hops.

BRAMANTE, *bra mahn'ta*, DONATO (1444-1514), a great Italian architect, the founder of the Middle Renaissance school of architecture. Bramante began his career in Milan, where his greatest work was the choir and dome of Santa Maria delle Grazie. At the age of fifty-five he went to Rome, where a study of the great Roman monuments changed his style completely, and he became the leader of a new school. He was patronized by the Popes, and his greatest work was done as the first architect of the Church of Saint Peter. Owing to his death, his plans were never carried out, but they exercised a great influence on the work of later architects.

BRAMBLE, the name commonly applied to a bush with trailing prickly stems, which is called in Scotland, brambles, and in England, blackberry. It is rarely cultivated, but as a wild plant it grows in great abundance. The flowers do not appear till late in the summer, and the fruit, which is deep purple or almost black in color, does not ripen till autumn.

BRAN, the outer coat of cereal grains, obtained as a by-product in the process of milling (see **FLOUR**). Usually a qualifying word is used to show the kind of bran meant, as corn bran, rye bran, etc., but when wheat bran is referred to it is customary to use only the term *bran*. Wheat-bran preparations for mixing with flour find a ready market because bran has laxative effects. Mixed with cornmeal it is an admirable stock food, especially for dairy cows.

BRANDEIS, *bran'dise*, LOUIS DEMBLITZ (1856-), an American jurist, known especially as the advocate of liberal ideas in the political and economic life of the country. When appointed Associate Justice of the United States Supreme Court by President Wilson in 1916, he was opposed in the Senate by a powerful group of members who distrusted his radical tendencies, and it was

five months before his confirmation by the Senate was secured.

Justice Brandeis was born in Louisville, Ky. After his graduation from the Harvard Law School in 1877 he began the practice of law in Boston, where he lost both clients and friends because of his vigorous opposition to certain "special interests." He figured also in railroad investigations, in movements for safeguarding the health of women and children workers, as an advocate of industrial arbitration and in similar lines of activity. Many of his criticisms of railroad management were found to be justified by subsequent developments, especially after the government took over the roads in 1918.

BRANDENBURG, *brahn'den boorK*, the most populous province of Prussia, the leading state of the former German Empire. Berlin, the largest city of Germany, is in Brandenburg, which occupies a central position in Prussia and is 15,376 square miles in area. In 1933 it had a population of 2,725,700, an average of about 181 persons to the square mile. The surface of the province is flat, and the country is well watered by over 600 lakes and numerous rivers, including the Oder and the Elbe. There are numerous canals. The principal crops are barley, rye, potatoes, tobacco, hemp, flax and hops. The most important manufactures are wool, silk, linen, paper and leather. The chief cities, besides Berlin, are Potsdam, Konigsberg and Frankfort-on-the-Oder.

From 1415, when Frederick of Hohenzollern was invested with the title of elector of Brandenburg, until the end of the World War, in 1918, the province was under the rule of the Hohenzollern dynasty. Elector Frederick III incorporated Brandenburg into the kingdom of Prussia in 1701 and took the title of King Frederick I of Prussia. See PRUSSIA; GERMANY.

BRANDES, *brahn'des*, GEORG MORRIS COHEN (1842-1927), a Danish critic, one of the foremost literary men of his time. He was born in Copenhagen. Brandes was the first man to infuse into Danish thought and literature the ideals and tendencies of modern European literature, and he has had a quickening influence on thought outside of Denmark. Among the most important of his earlier works was the series of lectures delivered at the University of Copenhagen and afterward published as the *Main Literary Currents of the Nineteenth Century*. Later

works include *Danish Poets*, *Eminent Authors of the Nineteenth Century*, *Men and Works in European Literature* and *Recollections of My Childhood and My Youth*.

BRANDON, MAN., on the Assiniboine River, is the center of an agricultural district containing nearly 300 small towns and hamlets. It is 133 miles west of Winnipeg, on the Canadian Pacific and the Canadian National Railways, and is the terminus of the Great Northern in Manitoba. It is the seat of Brandon College and the provincial Normal School. The manufacturing interests are extensive and varied. Population, 1921, 15,397; in 1931, 17,082.

BRANDY, the liquor obtained by the distillation of wine, or the refuse of the winepress. It is naturally colorless, but derives a pale amber color if placed in wooden casks. Sometimes it is darkened by means of coloring matter. The best brandy is made in France, particularly in the Cognac district in the department of Charente.

Much of the so-called brandy sold in England and America is made from more or less coarse whisky, flavored and colored to resemble the real article; and France also exports quantities of this sort of brandy. In America various distilled liquors get the name of brandy, as apple brandy or peach brandy, being named from the fruit from which they are made. Brandy is often used in medicine as a stimulant.

BRANDYWINE, **BATTLE OF THE**, a battle of the Revolutionary War, important because the outcome made it possible for the British to enter Philadelphia. It was fought near Brandywine Creek, at Chadd's Ford, Pa., September 11, 1777. The American force of 11,000 was commanded by General Washington; 18,000 British soldiers were under General Howe. The British took the offensive, and by a brilliant flank movement on the part of Cornwallis, forced the Americans to retreat. The losses were about equal.

BRANGWYN, *brang'win*, FRANK (1867-), an English painter, illustrator and etcher, regarded as one of the most versatile artists of his day. He was born in Bruges, Belgium, where his father was established as a manufacturer of ecclesiastical embroideries and garments. Brangwyn studied in England in the South Kensington art school and in the studio of William Morris. Though his paintings show his indebtedness to Morris in respect to their decorative quality, his

deepest and most lasting impressions were acquired through extensive travels in the East. In his paintings he emphasizes color, and in his etchings he brings out contrasts of light and shade, at all times suppressing those details which keep a work of art from being universal in character. He has achieved magnificent results in such mural paintings as *Modern Commerce*, in the Royal Exchange, London, and a series for the Pan-American Exposition at San Francisco. *London Bridge* and *The Paper Mill* are representative etchings. In 1904 Brangwyn was elected a member of the Royal Academy.

BRANT, JOSEPH (Thayendanega) (about 1742-1807), a Mohawk Indian chief. At the age of thirteen he accompanied his two elder brothers, who took part in Sir William Johnson's campaign against the French at Lake George. He was sent to the Rev. Eleazar Wheelock's Indian school at Lebanon, Conn., became interpreter to a missionary and was frequently employed by Johnson as an agent among various tribes.

During the Revolution the Mohawks adhered to the British, and Brant received a commission in the British army, in which he attained the rank of colonel. He participated in the Battle of Oriskany, one of the bloodiest engagements of the war, and led the Indians in many raids on the border settlements of New York, but he was not present at the massacre of Wyoming. After the war he removed to an estate in Canada granted by the British government, and at Brantford, Ont., there is a statue in honor of him.

BRANTFORD, ONT., the county town of Brant County, situated on the Grand River and on the Canadian National R'y, seventy miles east of London, also served by the T. H. & B. and Michigan Central Railways. Electric lines connect with other cities. The city contains the Ontario institution for the education of the blind. The leading industries are the manufacture of agricultural implements, foundry products, engines and boilers, automobiles, silk and rubber goods. Brantford was named for the Mohawk chief Brant. Here Alexander Graham Bell perfected the telephone and sent the first long distance message. The town is the headquarters for the Amalgamated Tribes of the Six Nations. Population, 1931, 30,107.

BRASS, one of the most important alloys, is produced by combining copper and zinc.

As most generally seen it is bright yellow in color and is not unlike gold in appearance, a fact which is responsible for its use as a metal for cheap jewelry. Brass buttons for uniforms, brass gas fixtures, brass beds and brass door knobs are a few of the many familiar objects made of this alloy, and it is also employed extensively in the manufacture of wire screening. Brass is harder than either of the metals of which it is made, and it resists the action of air better than copper. A coating of lacquer or varnish, however, is necessary to keep it from tarnishing. The metal can be cast in molds, drawn into fine wire or rolled into sheets. Different varieties are obtained by varying the amounts of zinc and copper. Ordinary yellow brass contains two parts of copper to one of zinc, but doubling the proportion of copper produces a reddish brass.

In the process of manufacture it is customary to heat thin pieces of copper, charcoal and carbonate of zinc in crucibles, and then to cast the molten metal into bars or ingots or to pour it into molds, according to the purpose in view. Brass ingots are passed through heavy rollers in the manufacture of sheet brass; the complicated processes involved in the manufacture of brass wire are described in the article **WIRE**.

BRAZEN SERPENT. In very ancient times the serpent was elevated to the dignity of a god of healing. Assyrians and Babylonians made serpents of metal and placed them as guards at the doors of their places of worship. Moses caused a brazen serpent to be elevated above his sorely-tried people; any person looking upon it would be healed (see *Numbers XXI, 9*). Several hundred years later incense was burned to brazen serpents by the Hebrews.

BRAZIL, *brazil'*, IND., founded in 1844, is the county seat of Clay County, sixteen miles northeast of Terre Haute and fifty-seven miles southwest of Indianapolis. It is on the Chicago & Eastern Illinois, the Pennsylvania, and the Baltimore & Ohio railroads. The industries center largely in the manufacture of clay products, particularly brick, sewer pipe, conduits, flue linings and silo blocks. There are a Federal building, a court house, several large bank buildings, a hospital, two city parks and five recreation centers. There is also a Carnegie Library. Population, 1920, 9,293; in 1930, 8,744, a loss of about five per cent.



A rubber
gatherer's home

BRASIL, THE UNITED STATES OF, a South American republic of federated states, the largest and richest country of the continent. With an area of about 3,280,900 square miles, Brazil covers nearly half of the continent, and within its boundaries may be found over forty per cent of the inhabitants of South America. Brazil is the only South American country in which Portuguese is the official language. It contains the world's greatest

river system—the Amazon—and it is the source of four-fifths of the world's coffee supply. It also leads all other countries in the production of cacao, from which we derive chocolate and cocoa, and it is one of the few lands from which crude rubber is obtained. This interesting country touches the border of every South American nation except Ecuador and Chile; the rest of its boundary line is formed by the Atlantic Ocean, which encloses it on the northeast, east and southeast.

People and Cities. Various estimates have been given for the population of the Brazilian republic, but the tendency is to give higher figures than are warranted. The 1920 census gave a population of 30,645,300; an estimate in 1934, 43,323,660. Less than half of the inhabitants are of the pure white race, and about one-third are half-breeds. The remainder are negroes and Indians, many of whom live under very primitive conditions. The whites are chiefly of Portuguese descent, but their numbers have been materially increased by European immigrants. To encourage the country's development the Brazilian government offered special inducements to colonizers, with the result that large numbers of Germans, Italians and Russians were attracted to the country. The Germans became especially numerous and active in the southern states, and at the outbreak of the World War were said to number 500,000.

The chief cities are Rio de Janeiro (the capital), São Paulo, Bahia, Recife (Pernambuco), Belém (Para), Santos, and Manaos.

Education and Religion. While education

is free, it is not compulsory, and for many years the illiteracy rate has been high, especially in the interior districts. In 1911 a decree was issued for the reform of the school system, and a Board of Education with full control over all schools was provided for. The large cities possess libraries, museums and professional schools. The government maintains schools for the blind, deaf and dumb at Rio de Janeiro, and a school of arts and a national institute of music in the same city. At Rio de Janeiro and in six other large cities there are engineering schools, and a mining school is maintained at Ouro Preto. In addition there are colleges of law, pharmacy, medicine and other professional institutions in various parts of the republic. There are three universities—one official, two private. The government maintains twenty-nine colleges for the education of teachers, and there are fifteen private schools of a similar nature. In various cities are nearly a hundred industrial schools, forty agricultural schools, and fifty commercial schools.

The great majority of the people are Roman Catholics, but there is no State Church, and all religious bodies enjoy freedom of worship.

Surface and Drainage. The outstanding physical features of Brazil are the plateau region known as the Brazilian highlands, and the great Amazon basin. The plateau region occupies the southern and eastern part of the country, and geologically is the most ancient section of the continent. Traversed by mountain ranges of very irregular distribution, and broken by numerous river valleys, it presents a striking picture of the effects of erosion. Three mountain systems may be distinguished, the chief of which is the Serra do Mar, forming the northeastern edge of the plateau. A narrow strip of land separates it from the ocean, and the name means *Sea Mountains*. The highest summit in Brazil, Mount Itatiaya, with an altitude of 8,900 feet, is a prominent feature of this range. A second range, the Serra Central, joins the Serra do Mar not far from Rio de Janeiro, and extends northward, while a third range branches off to the northwest, separating the sources of the São Francisco and Tocantins rivers from those of the Parana. West of the Brazilian Highlands there is another highland region extending to the Andes and forming the divide between the tributaries of the Amazon and those of the

Rio de la Plata. Brazil is also separated from the Guianas and Venezuela by mountain ranges.

The Amazon basin is a region of marvels, and there are large areas in its tropical forests that no white man has ever explored. In 1914 Theodore Roosevelt nearly lost his life while exploring a section of the wild country, and it was on this expedition that he discovered a new tributary of the Madeira, nearly 1,000 miles long. Skeptical critics called it the "River of Doubt," but later investigations proved its authenticity, and the Brazilian government named it officially the Rio Teodoro.

The Amazon basin lying to the north and west of the Brazilian tableland, and covering over half the total area of the country, is a vast plain less than 500 feet above sea level. The total length of the Amazon and its branches within Brazil—the Negro, Madeira, Tocantins and other rivers—is about 19,000 miles; an aggregate of 13,000 miles is open to navigation. This magnificent system drains about two-thirds of the country. Other important streams are the Paraguay and Parana, whose combined drainage basin covers about one-fourth of Brazil. The chief river of the eastern plateau is the São Francisco, navigation on which is interrupted sixty miles from the mouth by falls.

Climate. With the exception of the two most southerly states, Brazil lies wholly within the tropical regions; yet, owing to the modifying influences of altitude and winds, the temperature seldom exceeds 95° and is remarkably even in most portions of the country throughout the year. Most of the country receives a very heavy rainfall; those portions of the Amazon basin near the coast have an annual rainfall of from seventy-five to 100 inches, but farther inland the fall increases in certain localities to from 300 to 400 inches. The plateau on the east also receives an abundance of moisture, but the states immediately south of the Amazon near its mouth receive less rainfall than other portions of the country and occasionally suffer from prolonged droughts, as do certain portions of the interior. Most of the rain falls between January and June, while from June to October the weather is comparatively clear and dry.

Products of the Soil. Though the vast agricultural riches of Brazil have been hardly more than tapped, the country is a

great storehouse of many important products. The states of São Paulo, Rio de Janeiro, Espirito Santo and Minas Geraes are the principal coffee sections, São Paulo alone furnishing half of the world's supply; all Brazil provides three-fourths of the world's coffee. Rubber from the Belem (Para) district is the best in world markets. Brazil is the second country in the world in the production of cocoa. Here, also, is the chief source of supply of carnauba wax, used very widely for electrical insulation and phonograph records. Five million tons of corn are raised yearly; the banana crop is 54 million bunches; sugar, nearly a million tons; cotton, 120,000 tons.

Manufacturing. Cotton weaving has shown rapid development within recent years, and Brazilian factories supply the home demand for all but the finest grades of cloth. At Rio de Janeiro and other manufacturing centers there are manufactories of woolen goods, flannels, rugs, felts, etc., and silk manufacture is being encouraged. The country imports large quantities of wheat flour from Argentina and Uruguay, but flour milling is carried on to a considerable extent in Rio de Janeiro. The making of malt liquors is also important.

Minerals and Mining. Brazil has valuable mineral resources, but mining is in rather a backward state. Coal, diamonds, gold, manganese ores and petroleum are found in workable quantities, and Brazil furnishes the greater part of the world's supply of monazite. Small quantities of mica, talc, copper ore, platinum, rock crystal and agate are also found.

Transportation. Brazil has in excess of 22,275 miles of railway, of which 13,150 are owned by the Federal government and 1,600 by the states; the remainder is privately operated. Within recent years a unified railway system connects with the main lines owned by Uruguay, Paraguay, and Argentina. In the remote forest regions of the Amazon basin the only transportation lines are the rivers.

Government. Brazil is a federal republic comprising twenty states, one national territory and one Federal district. The government is based on a constitution which very closely resembles that of the United States. The executive power is vested in a President, Vice-President and nine ministers. The latter are at the head, respectively, of

the departments of Finance, Justice and Interior, War, Marine, Foreign Affairs, Communications and Public Works, Agriculture, Labor, and Instruction and Public Health. The legislative department consists of a Senate and Chamber of Deputies. The Senate consists of two members from each state, and three from the Federal district, elected by the people for nine years, the terms of one-third of the Senators expiring every three years. The Chamber of Deputies consists of 300 Deputies elected by popular vote for three years, and apportioned to the states according to population.

Each state has its own governor and legislature and is in many respects more independent than are the states of the American Union, since the states of Brazil have the privilege of treating with foreign powers concerning commercial affairs, and any state may divide its territory into other states or two or more states may consolidate. Each state is divided into municipalities and districts for the purpose of local government.

History. Brazil was first seen by Vicente Pinzon in 1500. Between 1532 and 1535 the country extending from 30° south to the equator was divided into twelve districts whose boundaries extended westward without limit. These districts were granted to independent captains for colonization, but the plan failed and the claims reverted to the Portuguese crown. The early settlers enslaved the natives and in 1549, when Jesuit missionaries began to work among the Indians, the settlers entered a protest against this practice. After a prolonged conflict, in 1680 slavery of the Indians was abolished, but negro slavery took its place.

From 1580 to 1640 the country was in the possession of Spain. In 1691 gold was discovered, and diamonds were found about twenty years later. These discoveries led to a rapid increase in the number of settlers. At the invasion of Portugal in 1807 by the French, Brazil became the residence of the royal family and was for fourteen years the seat of government. When King John VI returned, he left his oldest son, Dom Pedro, as prince regent of Brazil, but in 1822 the country proclaimed its independence and made the regent emperor. Dom Pedro was succeeded by his son, Dom Pedro II, who was invested with the crown at fifteen years of age. He proved a wise and able ruler, and during his long administration the coun-

try made rapid advancement; but notwithstanding Dom Pedro's excellent rule, there was a growing desire for a republican form of government, and in 1889 the royal family retired to France, and the present government was organized.

The most important event of late Brazilian history was the intervention of the country in the World War. Germany's submarine policy caused intense feeling in Brazil, and in 1917 war was declared against the Central Powers. In September, 1922, a great International Exposition was held in Rio de Janeiro, to celebrate the centennial of independence. A successful revolution in 1930 made its leader, Dr. Getulio Vargas, Provisional President of the nation. Under his guidance a new Constitution was promulgated in 1934, and Vargas was elected as Constitutional President.

Related Articles. Consult the following titles for additional information:

Amazon	Pernambuco
Bahia	Santos
Madeira River	São Paulo
Manaos	São Francisco
Para	Tocantins
Parana	Uruguay River

BRAZIL NUT, or PARA NUT, the seed of a tree found in Brazil, especially along the Amazon and the Orinoco rivers. In America the nut, with its dark brown, wrinkled shell, is commonly known under the name of *nigger-toe*. It may not be commonly known, however, that the nuts when on the tree are packed together, about twenty in a lot, in a hard-shelled seed vessel something the color of a coconut and nearly half a foot in diameter. Brazil nuts are a popular delicacy, and are the source of a useful lubricating and fuel oil. The tree which bears the nuts is a stately plant which sometimes reaches a height of 150 feet. It has bright green leaves and cream-colored flowers.

BRAZIL WOOD, a kind of wood yielding a red dye, obtained from several trees native to the West Indies and Central and South America. The wood is hard and heavy, and as it takes on a fine polish it is used by cabinet-makers for various purposes. The dye is obtained by reducing the wood to powder and boiling it in water.

BRAZOS, *brah'zose*, the principal river wholly within Texas, formed by the junction of Clear and Salt forks. It flows southeast by a winding course and empties into the Gulf of Mexico, forty miles southwest of

Galveston. It has a length of 900 miles and is navigable during high water for 300 miles, and at all seasons for forty miles from the Gulf.

BREACH OF PROMISE, the term generally applied to the refusal of one of the parties to a marriage engagement to carry out the promises made. Legal action against the violator of a promise to marry is more common in America than in Europe; in some American states laws now prohibit action for breach of promise being instituted. The feelings of the injured party are usually solaced by the award of damages, and it is obvious that breach of marriage suits are sometimes a polite form of blackmail. In American law, incurable physical unfitness for marriage, contracted by one party after the engagement was made, is a legal reason for the other's refusal to marry. The defendant in breach of promise suit is also legally justified in refusing to keep his promises if it can be proved that the other party has been guilty of immoral conduct.

BREACH OF THE PEACE. See MISDEMEANOR.

BREAD, *bred*, a preparation of flour or meal and water, considered the mainstay of the people in nearly all civilized countries. During the World War the expression "reduction of the bread ration" was heard frequently, and it always carried with it the idea of serious food shortage in the country in question. The term does not mean any particular form of meal preparation, but a very wide variety of baked foods. To the American or Canadian it means primarily a large, light loaf of white-flour bread, and secondarily, loaves of a darker color, in which rye, graham, whole wheat or some other grain is the principal ingredient. In many parts of Europe, however, the peasants eat rye, barley or oat bread almost exclusively, either in the form of loaves or small cakes, and rarely taste a wheat-flour bread. Indeed, few know how to use the latter.

Kinds of Bread. There are numerous kinds of bread, according to materials and methods of preparation, but all may be divided into two classes: *fermented, leavened or raised*, and *unfermented, unleavened, or not raised*. Originally all bread was unleavened, but both kinds have been in use from early Bible times. Of the raised breads, that made with yeast from white flour has always been the favorite brand

used in North America, but the necessity for conserving wheat flour brought into use a number of wheat substitutes during the World War. Biscuits, muffins and cornbread are other forms of raised bread, but they are made with baking powder or soda, each of which has an effect similar to yeast (see YEAST; BAKING POWDER).

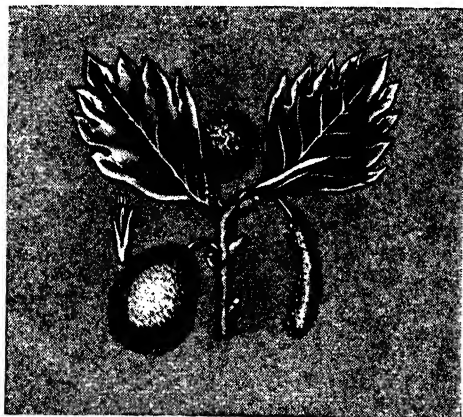
Unleavened breads are also popular. They include *aerated* bread, made with water charged with carbonic acid; *salt-rising* bread, in which a sour batter of cornmeal and milk provides the necessary lightness; the *oaten cakes* and barley meal *bannocks* of the Scotch; the *corn pone* of the Southerners; crackers (called *biscuits* in England), and pancakes made from self-rising flours.

Food Value of Bread. Generally speaking, all kinds of bread are nutritious, the most important element entering into their composition being carbohydrates (starch and sugar). Wheat bread made from high-grade patent flour is 56.5 per cent, or over half, carbohydrate, while in whole-wheat bread the proportion is 49.7 per cent, in cornbread 46.3, in rye bread 53.2 and in crackers 71.9. Good bread is not only nutritious but wholesome, for under right conditions it is completely digested and it has no waste. A diet of bread alone, however, would not be wholesome, because bread is poor in protein and needs to be eaten with meat and vegetables. Heavy, soggy bread is to be avoided because when chewed it forms in solid lumps that are very hard to digest. The tendency of the inside of hot bread to do this is the basis for the popular prejudice against bread fresh from the oven. If such bread is finely chewed and mixed with saliva before being swallowed it is perfectly digestible. Breads with a hard crust such as the so-called Vienna rolls, are of special value because they make vigorous chewing a necessity.

See articles on the various cereal grains, such as wheat, barley, rye, etc.

BREADFRUIT, a large round fruit of a pale-green color, six or eight inches in diameter, marked on the surface with irregular six-sided depressions, and containing a white and somewhat stringy pulp, which when ripe becomes juicy and yellow. The tree that produces it grows on the islands of the Indian and South Pacific oceans. It is about forty feet high, with large and spreading branches and large, bright green leaves over

a foot in length. The fruit is generally eaten immediately after being gathered, but it is also often prepared so as to keep for some time, either by baking it whole in closed, underground pits, or by heating it into paste and storing it underground, where a slight fermentation takes place. The eatable part lies between the skin and the core and is somewhat of the consistency of new bread.



BREADFRUIT

Mixed with cocoanut milk it makes an excellent pudding. The inner bark of the tree is made into a kind of cloth. The wood, when seasoned, closely resembles mahogany and is used for the building of boats and for furniture. Though the tree can be grown in Southern Florida the fruit cannot be marketed in the North because it will not keep when shipped a long distance.

BREAKWATER, a work constructed in front of a harbor to serve as a protection against the violence of the waves. The name may also be given to any structure which is erected in the sea, with the object of breaking the force of the waves without and producing a calm within. Breakwaters are usually constructed by sinking loads of unwrought stone along the line where they are to be laid, and allowing them to settle under the action of the waves. When the mass rises to the surface, or near it, it is surmounted with a pile of masonry, sloped outwards in such a manner as will best enable it to resist the action of the waves. The great breakwaters are those of Cherbourg in France, Plymouth in England, Delaware Bay and Buffalo in America and Valparaiso in Chile. In less important localities floating break-

waters are occasionally used. These are built of strong open woodwork, partly above and partly under water, divided into several sections and secured by chains attached to fixed bodies. The breakers lose nearly all their force in passing through such a structure.

BREASTED, *brest'ed*, JAMES HENRY (1865-1935), an American archaeologist and specialist in ancient history, born in Rockford, Ill. After completing courses at North Central College, Chicago Theological Seminary and Yale, he received his Ph. D. at Berlin in 1894, and from 1895 was associated with the University of Chicago as specialist in Egyptology and Oriental languages. Dr. Breasted was appointed head of the university Oriental Institute in 1919, and in 1925 he was relieved of all teaching duties, that he might give personal attention to various archaeological expeditions to Egypt and Western Asia. He made numerous translations of inscriptions on Egyptian monuments, was active as a lecturer and was a voluminous writer. His *History of Egypt* is outstanding in that field.

BREATHING, the passage of air into and out of the lungs. The two acts involved are called *inspiration* (breathing in) and *expiration* (breathing out). As air is drawn into the lungs oxygen is given up to the blood, and a waste matter called carbon dioxide is taken from the blood. In the act of expiration this waste matter is expelled into the air. Carbon dioxide is poisonous to animal life, and if not expelled causes death.

Breathing is normally a mechanical process; it goes on without our taking thought of it. The number of breaths taken by the adult in good health varies from sixteen to twenty a minute, but this number may be increased by violent exercise or some physical disorder, such as hysteria. When air is breathed in, the ribs are raised and the chest expands; when the act of expiration takes place the ribs return to their normal position. In the ordinary process of breathing the average adult inspires and exhales with each breath about thirty cubic inches (one pint) of air, called *tidal air*. A forced inspiration, however, may bring an additional 100 cubic inches into the lungs, called *complemental air*. No matter how forceful one exhales, however, there remain in the lungs about 100 cubic inches of *residual air*. The quantity of air which one can expire after the deepest possible inspiration is one's *vital*

capacity. This varies, of course, in different persons.

For the relation of breathing to health consult the article *Physical Culture*, subheads *Pure Air* & *Necessity and Breathing Exercises*.

BRECKINRIDGE, JOHN CABELL (1821-1875), an American soldier and statesman, Vice-President of the United States during Buchanan's administration. He was educated at Centre College, Ky., and began the practice of law, but the outbreak of the Mexican War, in which he served as major of volunteers, interrupted his career. After the war Breckinridge was elected to the Kentucky legislature, and from 1851 to 1855 he represented his state in Congress. His record so impressed the Democrats, nationally, that in 1856 he was nominated for the Vice-Presidency on the ticket with Buchanan, and was elected. Considerably before the expiration of his term as Vice-President, Breckinridge was elected to the United States Senate.

In 1860 Breckinridge was nominated for the Presidency by the Southern extremists who withdrew from the Democratic convention held in Charleston, S. C. In the election he received seventy-two electoral votes, but lost his own state. Taking his seat in the Senate, he opposed Lincoln's war policies, and in December, 1861, when secession was a fact, he enlisted in the Confederate army. Breckinridge was in active service throughout the war, attaining the rank of major-general. In February, 1865, he was appointed Secretary of War by President Davis. After Lee's surrender he lived in Europe and in Canada, until 1869, when he returned to Lexington, his old home. He devoted his later years to law practice and to the promotion of railroad building in Kentucky.

BREED'ING, the science of improving races or breeds of domestic animals and plants, or modifying them in certain directions, by continuous attention to their pairing in the case of the former and to cross-fertilization in the latter. Animals show great susceptibility of modification under systematic cultivation; and there can be no doubt that by such cultivation the sum of desirable qualities in particular races has been greatly increased. Individual specimens are produced possessing more good qualities than can be found in any one specimen of the original stock; and from the same stock many varieties are taken characterized by different advantages, the germs of all of

which may have been in the original stock but could not have been developed at the same time in a single specimen.

When an effort is made to develop rapidly, or to its extreme limit, any particular quality, it is always made at the expense of some other quality, or of other qualities generally, by which the intrinsic value of the result is necessarily affected. High speed in horses, for example, is only attained at the expense of a sacrifice of strength and power of endurance. So the celebrated merino sheep are the result of a system of breeding which reduces the general size and vigor of the animal and diminishes the value of the carcass. Much care and judgment, therefore, are needed in breeding, not only in order to produce a particular effect, but also to produce it with the least sacrifice of other qualities.

Breeding, as a means of improving domestic animals, has been practiced more or less systematically wherever any attention has been paid to the care of live stock, and nowhere have more satisfactory results been obtained than in Great Britain. The United States, France and Germany have also been successful in the development of high-bred live stock.

BREMEN, *brem'en*, GERMANY, a city in the northwestern part of the country, capital of the state of Bremen until state lines were obliterated in 1934. Next to Hamburg it is the chief German port, and it is the commercial center of Northwestern Germany. Bremen is situated on both banks of the Weser River, forty-six miles from the North Sea. It has four harbors, covering about 130 acres, and more than ten miles of docks.

The city is divided into old and new towns, as is true of many European municipalities, the new town being on the left bank of the Weser. In this section one sees the broad, handsome streets and fine buildings of an up-to-date city. The old town had an existence as early as the year 782 as a missionary center, and five years later was made the seat of a bishop by Charlemagne. In this section lies the extensive business district of the city; it is surrounded by fine promenades and gardens, constructed on the ancient ramparts. The chief manufactures of the place are woolen and cotton goods, cigars, paper, starch and liquors, and there are shipbuilding yards and sugar refineries. Population, 1933, 323,330.

BREMERHAVEN, *brem'er hah v'n*, GERMANY, a port on the estuary of the River Weser, founded in 1827 by the maritime interests of Bremen as a port for large vessels which could not at that time ascend the river to the latter city. It is now a shipbuilding center of first rank, and has the largest drydocks and marine repair shops in all Germany. The city is connected with Geestmünde, across the River Geeste, by a drawbridge. Population, 1933, about 30,000.

BRENT GOOSE, or **BRANT GOOSE**, a wild goose found in most parts of the northern hemisphere, remarkable for its length of wing and the extent of its migration. The bird is about twenty-six inches in length. It may be seen as far south as the Carolinas in winter, but its nesting grounds are far to the north, beyond the Arctic Circle. See **GOOSE**.

BRESCIA, *bresh'shah*, ITALY, capital of a province of the same name, situated in a plain at the foot of the Alps, fifty-two miles east of Milan. Among its chief buildings are the new cathedral, the Rotonda, or old cathedral, the city hall, called La Loggia, and the Broletto, or courts. Besides these, there are a museum of antiquities, a botanic garden, a fine public library and a theater. Near the town are large iron works, and the firearms made here are among the best that are made in Italy. There are also silk, linen and paper factories, tanyards and oil mills. Brescia was the seat of a school of painting of great merit. The city became the seat of a Roman colony under Augustus about 15 B. C. In the Middle Ages it rose to be an important city republic, and in the beginning of the fifteenth century it was under the protection of Venice. In 1815 it was assigned to Austria, by the Vienna Treaty, and in 1859 to Sardinia, by the Treaty of Zurich. Population, 1931, 119,000.

BRESLAU, *bres'low*, GERMANY, an important industrial city and the capital of the province of Silesia, attractively situated on the Oder River, 202 miles southeast of Berlin. The public squares and buildings are handsome, and the fortifications have been converted into fine promenades. The cathedral, built in the twelfth century, the Stadthaus, the Church of Saint Elizabeth, and the Rathhaus, or town hall, a Gothic structure of about the fourteenth century, are among the most remarkable buildings.

There is a flourishing university, with a museum, a library of 400,000 volumes, and a student enrollment exceeding 2,500.

Breslau is the greatest industrial and commercial center of Southeastern Germany; it is very close to important iron and coal fields, chief requisites of modern industry. As Silesia is close to Poland and Czechoslovakia, the city is a strategic location for a large military force of the Nazi state. Breslau was the seat of a bishopric by the year 1000, and in the Middle Ages it was ruled successively by the kings of Poland, the dukes of Breslau and the kings of Bohemia. In 1741 it was conquered by Frederick II of Prussia. Population, 1933, 625,000.

BREST, FRANCE, a seaport in the northwestern part of the country, on an arm of the Bay of Biscay. Brest is 389 miles west of Paris by rail. It has one of the best harbors in France, and is a very important port of call for transatlantic steamers. When the United States entered the World War and needed a great embarkation port in France, Brest was assigned to the Americans. The United States government built vast docks and spent millions of dollars in improving the harbor. More than 1,000,000 American soldiers entered France through Brest. Since the war the port has been further modernized. The harbor entrance is narrow and rocky, and the coast on both sides is well fortified. Brest stands on the summit and sides of a projecting ridge, many of the streets being exceedingly steep. The manufactures are inconsiderable. Population, 1931, 70,000.

BREST-LITOVSK, *brest lye tofsk'*, POLAND, formerly a first-class fortress in the western part of old Russia, capital of a district in the government of Grodno. It is situated about 100 miles east of Warsaw, at the junction of the Bug and Mukhavetz rivers. Captured and nearly destroyed by the Germans in the World War, Brest-Litovsk was made the headquarters of the German commander in occupied Russia, and here the Russian and German delegates met in 1917-1918 to negotiate the treaty of peace between Germany and Russia. This treaty, which was signed in March, 1918, foreshadowed the dismemberment of Russia, but the allies forced Germany to abandon it at the close of the war. Brest-Litovsk was a thriving commercial center before the war,

as it was situated at the junction point of railroads connecting Odessa with Königsberg and Moscow with Warsaw. Population, 1931, 91,335.

BRETON, *bre toN'*, JULES ADOLPH (1827-1906), a French painter, who exhibited a genius for depicting the life of the peasants among whom he was born. His works are characterized by tender feeling, but they lack that strength and power which mark Millet's work. Among Breton's principal paintings are *Blessing the Grain*; *Return of the Gleaners*, his most celebrated work; *Planting a Calvary*, and *Song of the Lark*. The original of the last named is a prized possession of the Chicago Art Institute. Breton also wrote both poetry and prose. Among his literary works are *Jeanne*, *The Life of an Artist*, *A Peasant Painter* and *The Fields and the Sea*.

BREVET, *bre vet'*, an honorary title received by a commissioned officer, which gives him higher rank than that which he holds in his regiment. A brevet officer does not have his pay increased, nor does he enjoy seniority over officers of his own rank except when he is on the field. In the United States army brevet officers are addressed by the titles of their brevet rank, but in England it is customary to use both titles. Brevet titles have been conferred in the American army for conspicuous bravery.

BREVIARY, a book containing all the ordinary and daily services of the Roman Catholic Church, except those connected with the celebration of the Eucharist. It includes those prayers contained in the *Missal*, which are read or sung in the celebration of mass, and those of the *Ritual*, used for funerals, marriages and baptisms.

BREWER, DAVID JOSIAH (1837-1910), an American jurist, born at Smyrna, Asia Minor, the son of an American missionary. He was graduated at Yale in 1856, studied law with his uncle, David Dudley Field, and at Albany Law School, and practiced in Leavenworth, Kan. There he served successively as probate judge, district judge and justice of the state supreme court. He resigned the last position in 1884, after fourteen years' service, to become United States circuit judge. President Harrison appointed him Associate Justice of the United States Supreme Court in 1889, and he was a member of the Venezuelan Boundary Commission and arbitration tribunal.

BREWING, the process of manufacture of liquors not produced by distillation (which see), particularly beer and ale. When brewing is referred to, the making of beer at once comes to mind, as nearly all brewing is concerned with the making of that drink. (See BEER.) There are two processes employed—*malting* and *brewing*.

Malting. The first process consists in causing the grain to germinate, for the purpose of changing its starches into sugar. This is done by steeping the grain (barley) in large cisterns, in which it remains covered with cold water for three or four days. During this period the grain absorbs water, and it swells. Next this soft, pulpy grain goes to a germinating floor, where it remains nearly a week. Here the barley germinates—sends out tiny rootlets; care must be exercised that germination does not proceed too rapidly or continue too long. Germination is checked at the proper time by drying the grain in a kiln, at a temperature of 150° if paleness is required in the beer, and 200°, if browner color is desired.

Brewing. The grain, now called *malt*, is crushed between rollers and mixed with warm water, forming *mash*; in this state its temperature is gradually raised to about 160°. After the mash has been boiled to produce partial solution, by raising its temperature to nearly 200°, it is run into other tubs and allowed to stand from thirty to fifty minutes while the change from starch to sugar is completed. The mass is now known as *wort*. After it has been allowed to settle it is run into copper boilers and boiled with hops, in the proportion of about three bushels of wort to three pounds of hops. Cooling follows by passing this mixture either through or over cool pipes, ammonia being used for this purpose. Then in vats fermentation takes place. This is begun by adding one pound of yeast to every twenty gallons of wort; the mixture thus stands for a number of days, after which another period of settling follows. The mixture is now beer, and it is put into casks, where it is allowed to ripen for at least two months before being marketed.

In 1919 brewing ceased legally in the United States, by virtue of war necessity which demanded all grains for foodstuffs. The revival of the industry was expected at the close of the war, but the Eighteenth Amendment to the United States Constitu-

tion, effective in January, 1920, prohibited the manufacture of all intoxicating beverages, except for medicinal use. In 1933 the Eighteenth Amendment was repealed.

BREWSTER, DAVID, SIR (1781-1868), a Scotch physicist, one of the greatest scientists of the nineteenth century. He was educated for the ministry, but gave this work up to study science, to which he was first attracted by the lectures of Robson and Playfair. In 1808 he became editor of the *Edinburgh Encyclopedia* and the next year, in conjunction with Jameson, founded the *Edinburgh Philosophical Journal*, which later became the *Edinburgh Journal of Science*. Brewster was one of the founders of the British Association for the Advancement of Science and was its president in 1850. Among his inventions were the polyzonal lens, the kaleidoscope and the improved stereoscope. His chief works are a *Treatise on the Kaleidoscope*, *Letters on Natural Magic* and *Life of Newton*.

BREWSTER, WILLIAM (1560-1644), the leader of the *Mayflower* Pilgrims, was born at Scrooby and educated at Cambridge. He left the Established Church and founded a separate society in his house, and in 1608 went to Holland and opened a school at Leyden. He was made ruling elder, and after the voyage of the *Mayflower* (1620) he was the only spiritual teacher whom the Pilgrims had for years, but he did not administer the sacraments. He is venerated as the ruling spirit in the earliest New England colony.

BRIAND, breANd', ARISTIDE (1863-1932), a French statesman who held the arduous position of Prime Minister of France for a year and a half during the World War. He was elected to the Chamber of Deputies by the Radical Socialists in 1902, and soon became favorably known for general ability and soundness of judgment. His discretion and poise were especially shown in the way he administered the law separating Church and State, a task that fell to him in 1906 as Minister of Public Instruction and Worship. Three years later Briand became Prime Minister, the first Socialist to hold that office.

The most important event of his Ministry was the great railway strike of 1910, which he broke by calling into military service the men engaged in the strike. Rather than protect the roads against which they

were striking, the men returned to work. This incident shows how a man of radical tendencies will become conservative when burdened with great responsibilities, and it is significant that Briand was expelled from the Socialist party. He had the confidence and respect of the country at large, however, and after resigning the Premiership in 1911 he again held the high office for a brief period in 1913.

In August, 1914, the first month of the World War, Briand was appointed Minister of Justice in the Cabinet of Viviani. When this Ministry fell, in October, 1915, Briand for a third time headed the Cabinet, holding office until March, 1917. He became Foreign Minister in the Poincaré Cabinet in 1926, and in 1928 was co-author of the Briand-Kellogg Peace Pact, renouncing war as an instrument of national policy. He was Premier from June to November, 1929.

BRIBERY, in law, the offering or giving of reward for the purpose of inducing the receiver to act unlawfully in favor of the giver. It is especially common in connection with public service. A bribe need not be money, but may consist of anything which constitutes a satisfaction, such as property, position or service. Before the law, both parties to the transaction are held equally guilty, and large fines and even imprisonment are the punishments inflicted.

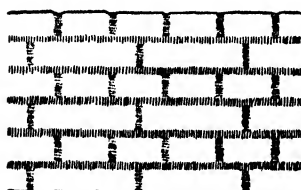
BRICK AND BRICKLAYING. Brick-making is an art as old as civilization itself. In the *Book of Exodus* we read that the enslaved Children of Israel had to make bricks for their cruel taskmasters in Egypt. The Israelites molded their bricks out of clay and sand and dried them in the sun, and the straw which they used in their work served as a binding material. The Assyrians and Babylonians also knew the art of making sun-dried bricks, and many of these contain inscriptions which are of great historic value, since they constitute the only known record of people and events of the time in which they were made. The Romans also made and used bricks, and it was through these people that the art of brick-making was introduced into England.

Modern Brickmaking. Clay is still the all-important ingredient, but kilns have supplanted the sun as a firing agent. In the manufacture of brick a good clay should be selected. This should be free from the remains of animals and plants and should

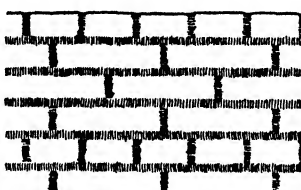
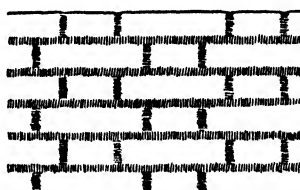
contain but little iron or lime. The clay should also contain one part sand to two parts clay. If this proportion of sand is not present, enough needs to be added to make the required proportion. The clay and sand in proper proportions are ground with water into a plastic mass, which is forced out of the machine through an opening that forms a column having the length and width of a brick. As this column comes from the machine it is cut by wires into bricks of the required thickness. These fall upon an endless belt that carries them either to a machine for re-pressing or to tram

Bricks are extensively used in building, since the erection of steel frame buildings in cities makes them specially valuable in the construction of walls. They are also used for foundations, sewers, cisterns and numerous other purposes. Paving brick are used in paving the streets of cities. Brickyards are found wherever brick clay can be obtained and there is a local demand for the brick.

Bricklaying. In many countries the only available material for house building is brick. The solidity and durability of a brick building depends largely upon the manner in



English bond.

STYLES OF BRICKLAYING
American bond.

Flemish bond.

cars that take them to the drying sheds or drying tunnels, according to the plan of the plant. The bricks intended for finishing or facing either outside or inside walls are re-pressed in a steel mold to give them a smooth finish and sharp edges and corners. A good machine will make 100,000 bricks in a day. The bricks are fired in circular kilns about thirty feet in diameter and from ten to twelve feet high. The soft bricks are placed in these kilns so that the fire can surround them and raise all to the same temperature. Firing requires from six to ten days. The common bricks are heated to a cherry red, and the harder bricks to a white heat.

Varieties and Uses. There are numerous varieties of brick. The ordinary brick used in building and paving is eight inches long, four inches wide and two inches thick. Bricks of this style outnumber all other varieties. *Pressed* bricks are those repressed in the process of making and used for the finishings of exteriors and interiors. *Fire* bricks are made of fire clay and are used for filling the interior walls of fireproof buildings and lining the fire pots of furnaces and coal stoves. *Hollow* tiles are often used in constructing partitions in fireproof buildings. *Pavement* bricks contain lime, which fuses when they are burned and makes them very hard. They are known as *vitrified* brick.

which the bricks are laid. In laying the foundations of walls, the first courses should be thicker than the intended superstructure, and the projections thus formed, usually of quarter brick on each side, are called *set-offs*. Mortar composed of lime and sand is the common cement for brickwork. It should be equally and carefully applied. The most important thing in bricklaying is to see that the wall is properly bonded. The bricks of every course should cover the joints of the course below it, or, to use the bricklayer's phrase, the work must *break bond*. A layer of bricks is called a *course*. Bricks laid with their lengths in the direction of the course and their sides to the wall face, are called *stretchers*; those laid transversely, with their ends forming the wall face, *headers*; a layer of headers, a *heading course*; of stretchers, a *stretching course*.

The two kinds of bond almost exclusively used consist of alternate stretching and heading courses; and of a stretcher and header laid alternately in each course. The first bond is the strongest, but the second bond is the more ornamental and is in most general use. In order to strengthen the bond, bands of hoop-iron, tarred and sanded, are sometimes laid flatwise between the courses. This *hoop-iron bond* has superseded the old practice of using bond-timbers.



BRIDGE, a structure of wood, cement, stone, brick, iron, or other material, affording passage over a stream, valley, or another passageway, such as a railway or a carriage road. The earliest bridges were undoubtedly trunks of trees felled across narrow streams. These were followed by wooden structures built on a more elaborate plan. Bridges having wooden piers were in common use among the Romans; the *Pons Sublicus*, erected 621 B. C., is the oldest structure of the kind of which we have any record.

Arch Bridges. The Romans were also the first people to make use of the arch in building bridges and other structures. Portions of their great arched sewer, the *Cloaca Maxima*, still remain as a monument to the durability of their work. After the construction of such a work as this, the building of arched bridges across the Tiber must have been comparatively easy. One of the first examples of these structures was the bridge built by Augustus over the Nera, at Narni. It contained four arches, the longest having a span of one hundred forty-two feet.



STEEL ARCH BRIDGE AT NIAGARA FALLS

All large bridges are constructed after one of the following plans, arch, truss, tubular, cantilever, or suspension.

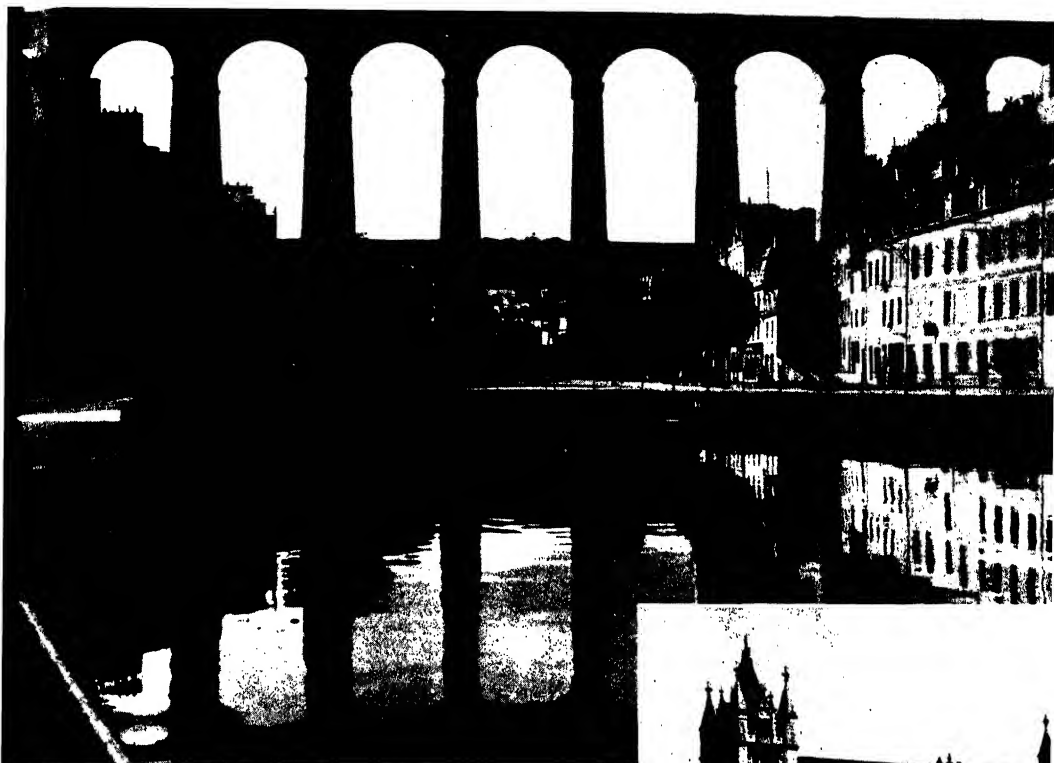
Truss Bridges. Iron was first employed in the construction of bridges about 1777. The first iron bridges were after the pattern of the stone arch, and cast-iron was used. The nature of the material gave the engineers greater latitude, however, and enabled them to construct arches with longer spans. The arch was gradually superseded by the girder and truss, and cast-iron by wrought-iron and steel, which is now the material almost universally employed in the construction of bridges.

The abundance of timber in the United

States led to its very general use for bridges for a long time. The necessity of spanning large streams early led to the invention of a framework which was self-supporting between the piers and also of sufficient strength to sustain any load that the bridge was required to carry. Such a structure is known as a truss. Trusses are of two kinds, simple and arched. A simple truss is one supported at its two ends without exerting any lateral pressure; an arched truss exerts both lateral and vertical pressure upon its supports. The Tri-Borough bridge in New York City (completed in 1936) is more than 18,000 feet long, including approaches. Its arms connect the boroughs of Manhattan, the Bronx, and Queens. It cost \$64,000,000.

Tubular Bridges. A tubular bridge consists of a tube, either rectangular or circular, made by riveting steel plates together. The tube rests on piers and abutments, and the roadway passes through the tube or over the top. The most noted bridge of this pattern is the Britannia Bridge over the Menai Straits, in Wales. This bridge has two spans of 450 feet and two of 250 feet; the tube is made of cast and wrought iron, and is 1,380 feet long, 28 feet deep and 13 feet 8 inches wide in the clear. The tube contains a single track. At the time of its completion, the first Victoria Bridge across the Saint Lawrence River at Montreal was the most celebrated bridge in the world. Its total length was 1½ miles; it contained 25 spans, the center one having a length of 330 feet, and each of the others of 242 feet, and cost about \$7,000,000. Both of these bridges were designed by Robert Stephenson of England. The Victoria Bridge was replaced by one of the steel truss pattern in 1898.

From the standpoint of the engineer, the length of span is the most important factor to be considered in the construction of bridges. Usually, the longer the span, the greater the difficulties to be overcome; hence, bridges with long spans rank higher as works of engineering than those of short spans, even though the latter class may include bridges of greater length. Some of the most celebrated truss bridges in the United States are the following: that across the Ohio River at Cincinnati, having a span of 550 feet; the bridge of the Illinois Central Railway across the Ohio at Cairo, Ill., having a span of 518½ feet; and the celebrated

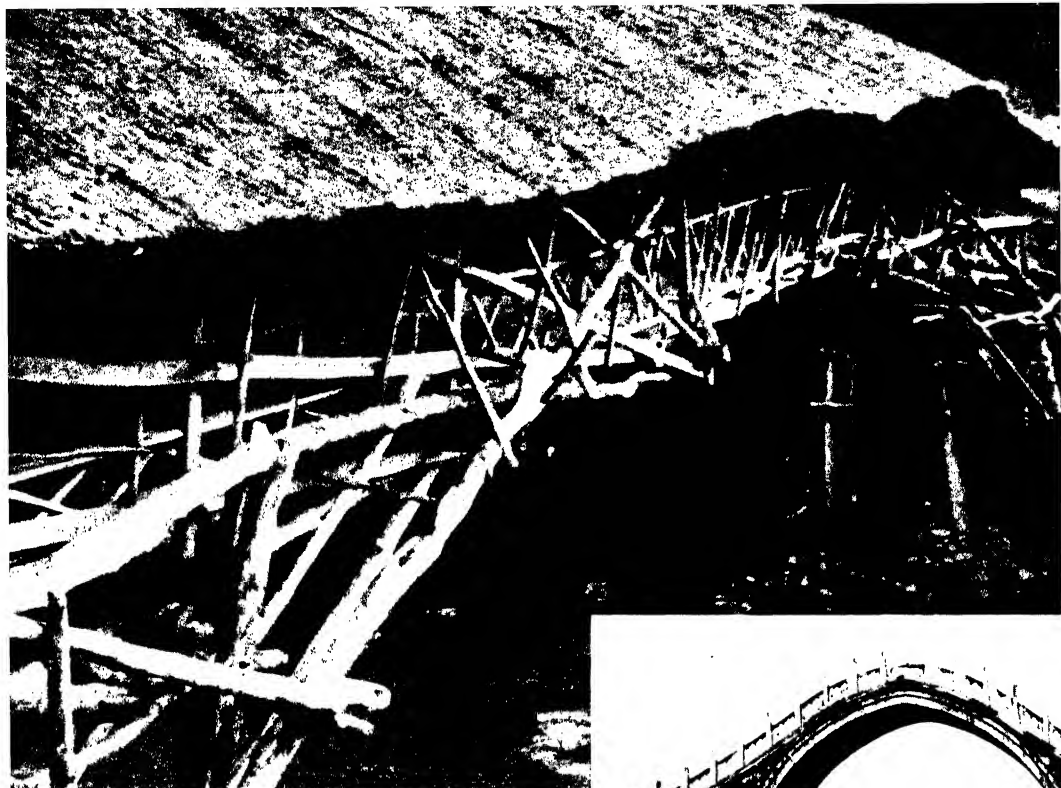


MODERN TRIUMPHS IN BRIDGE BUILDING

This double-decked viaduct in Brittany, France, the stately Tower Bridge spanning the Thamer at London, and the George Washington Suspension Bridge, across the Hudson River, are fine examples of engineering genius.

Kaufmann-Fabry; Ewing Galloway

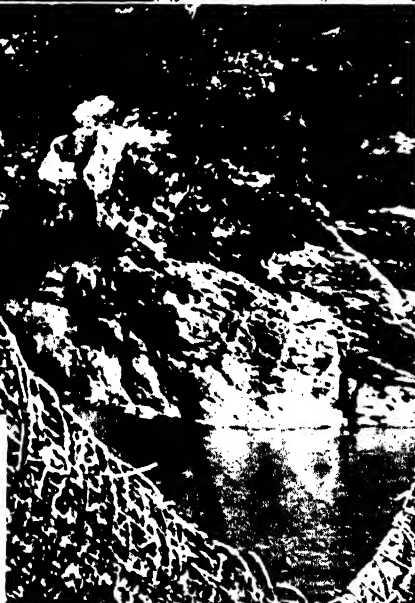




PRIMITIVE BRIDGES

Since the first felled tree was used to bridge a stream many ingenious types have been devised. This novel thatched roof bridge in Sumatra is nailless; the Japanese arch bridge combines grace with utility; remarkable swinging bridges are built by the natives of northern India.

Ewing Galloway: Kaufmann-Fabry



New York and Brooklyn, is one of the most celebrated suspension bridges. The Brooklyn Bridge was completed in 1883. Its success inspired engineers to greater accomplishment, and in later years many suspension bridges of greater width and longer span were constructed. Among the most prominent are the Queensboro, Williamsburg, and Manhattan Bridges, connecting Manhattan and Long Island, across East River; the Philadelphia-Camden Bridge, with a central span of 1,750 feet; the Ambassador Bridge, between Detroit and Windsor, Ont., with a span of 1,850 feet; and the great George Washington Bridge which crosses the Hudson River between New York City and Fort Lee, N. J. The towers of the George Washington Bridge are 600 feet tall; it has a clear span of 3,568 feet; it has two decks, giving ample space for vehicles, for electric railway tracks, and footpaths. This is the only toll bridge in New York City—10 cents for pedestrians, 50 cents for automobiles.

The greatest suspension bridge ever constructed extends across the wide bay between San Francisco and Oakland. The total length, with approaches, is about 7½ miles. It is double-decked, with six automobile traffic lanes on the upper deck and lanes on the lower deck for two lines of street cars and other lanes for buses and trucks. Another San Francisco bridge project is the Golden Gate Bridge, across the Golden Gate northward to counties formerly cut off from direct connection with the city. With its completion the west coast will have an unbroken highway from Seattle to San Diego.

North of New York City, near Yonkers, another great suspension bridge across the Hudson will be completed about 1940.

Drawbridges. Drawbridges are so constructed that they can be opened to admit of the passage of vessels. The draw may constitute the entire bridge, or it may be only a single span in a long bridge. Drawbridges are of three types: the swing bridge, consisting of a span supported on a center pier and revolving on a turntable; a lift bridge, so constructed that it can be raised to a sufficient height to allow vessels to pass under in the clear, and a lift bridge of the bascule type. The bascule bridge is adapted to narrow channels, where a center pier would obstruct navigation, and is gaining favor as a drawbridge over canals. In a bridge of this type the span is made in two

parts of equal length. When the bridge is closed, these parts form a complete arch.

Concrete Bridges. Nearly all concrete structures serving as bridges are more properly viaducts. The most famous of recent architectural triumphs of this nature is the Tunkhannock Viaduct, in Pennsylvania, one and a half miles in length and 240 feet high, completed in 1915. Small concrete bridges are popular in parks, and here beauty of design may make them extremely attractive. See also articles CONCRETE, ENGINEERING, and VIADUCT.

BRIDGE OF SIGHS, a bridge in Venice associated with the period of the Doges, and so called because condemned prisoners formerly passed over it on their way to the place of execution. It spans the canal between the



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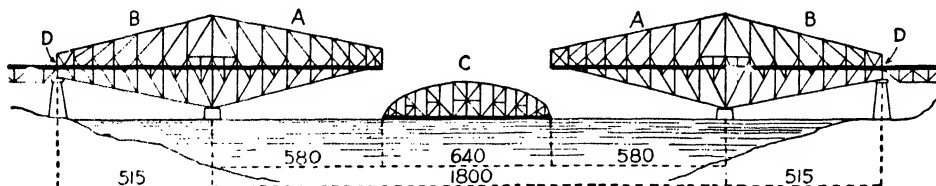
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Eads Bridge at Saint Louis, having three spans, one of which is 515 feet, and the others 497 feet each. This bridge is of the arched truss type and has two railway tracks, two tracks for electric cars, a drive-way and sidewalks. At the time of its construction the middle arch was the longest in the world.

Cantilever, or Suspension, Bridges.

Bridges of the cantilever type are taking the place of the old style truss and arch in many places. A cantilever truss has a shore

span between the towers is 470 feet, and the bridge is 245 feet above the river. Other noted bridges of this type are that over the Saint John's, in New Brunswick; that over the Hudson, at Poughkeepsie; that over the Mississippi, at Memphis, and that over the Firth of Forth, in Scotland. The largest cantilever bridge ever projected was that to span the Saint Lawrence above Quebec, having a central span of 1,800 feet. Before it was completed this bridge fell, in 1916, ruining the structure and causing the loss

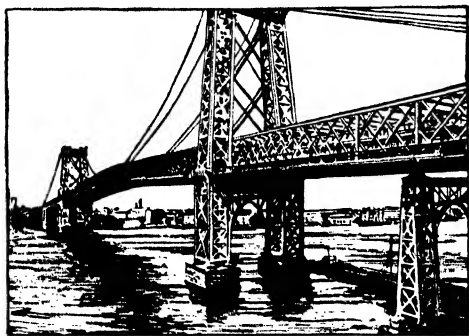


DIMENSIONS OF THE GREAT CANTILEVER BRIDGE AT QUEBEC
It was the central span, 640 feet in length, which fell in 1916, after it had been raised almost to its position.

arm and a river arm, which are supported on a tower in such a way that they practically balance each other. The river arms are joined by a central truss, and the entire structure is so made that the strain of the load is very evenly distributed over the bridge. The cantilever truss has great advantage over other patterns from the point of economy in construction, since temporary structures are required only under the shore armis. The river armis are extended from the towers and are self-supporting during construction. When joined by the center truss, the structure is complete. The first important bridge of this

of seventy-four lives. The last span was eventually put up safely, in September, 1917.

Suspension Bridges. A suspension bridge has a platform swung on cables which pass over towers, and are anchored at the abutments. The first modern suspension bridge in England was built about 1819. The great Suspension Bridge over the Niagara River, completed in 1854, marked an epoch in bridgebuilding and in the history of the country. This was the first great railroad bridge in America and was likewise the beginning of the westward extension of great railway systems. This bridge had a span of 821 feet and a width of 15 feet; it had two decks, the upper containing two railway tracks, and the lower a carriage road and sidewalks. Each deck was supported by two cables 10½ inches in diameter containing 14,040 wires each. The platforms were held in position by being attached to the cables by small cables of a similar make. In 1897 this bridge was replaced by one of the steel-arch type. A suspension bridge nearer the falls, and carrying a carriage road and sidewalks, was also replaced by a steel arch in 1893. This bridge long had the distinction of having the longest arch in the world, its span being 840 feet. Suspension bridges are now common in Great Britain and Europe. The Brooklyn Bridge, over East River, connecting the cities of



WILLIAMSBURG BRIDGE AT NEW YORK
type was erected over the Niagara River by the Michigan Central Railroad in 1882. The total length of this bridge is 910 feet; the



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It is the third city in the state in size, New Haven and Hartford being larger, is fifty-eight miles northeast of New York City, and is the county seat of Fairfield County. The city is served by the New York, New Haven & Hartford Railroad, and is on Bridgeport harbor, connecting with Long Island Sound; steamboats run daily to New York.

There are many beautiful buildings; among them are a Federal building, a courthouse, Burroughs' Public Library and the Barnum Memorial Institute, in memory of P. T. Barnum, the showman, who made Bridgeport the headquarters of his circus. Other institutions of note are a home for aged women, the Protestant Orphan Asylum, Saint Vincent's hospital, Bridgeport Hospital, Junior College of Connecticut, and the Young Men's Christian Association. The manufactures are important and varied; the leading manufactures are electrical supplies, sewing machines, brake linings, cutlery and fire arms. Population, 1930, 146,716.

BRIDGES, ROBERT (1844-1930), and English poet, the successor of Alfred Austin as poet laureate of England (1913). He was born on the Isle of Thanet, and educated at Eton and Corpus Christi College, Oxford. Having studied medicine at Saint Bartholomew's, London, he practiced his profession in that city until his retirement in 1882. After that time he devoted his life to literature, reaching notable rank as a poet. He composed eight plays in imitation of the classical style, a large body of lyrics, about three score sonnets in sequence, called *The Growth of Love*, a poetical version of *Eros and Psyche*, an essay on Keats and a study of Milton's prosody. His poetical works were republished in 1913 by the Oxford University Press. Dr. Bridges' verse shows his mastery of technique. He was the poet of the intellectual man rather than of the masses, but he left a number of beautiful lyrics that would appeal to anyone who enjoys rhythm. See **POET LAUREATE**.

BRIDGE WHIST. See **WHIST**.

BRIDG'MAN, LAURA DEWEY (1829-1889), a remarkable blind deaf-mute. At the age of two a severe illness deprived her of sight, hearing and speech, and to some extent, also, of smell and taste. She was placed in the Perkins Institution for the Blind, Boston, at the age of eight, and Dr. Howe undertook her education. She made

rapid progress and acquired a knowledge of geography and arithmetic, learned to do household work and to sew, both by hand and on the machine. After receiving her education, Miss Bridgman taught in the Perkins Institution.

BRIGADE, *brig ayd'*, a unit of an army, in the United States and British armies consisting of about 4,000 men, under command of a brigadier-general. It comprises three regiments (see **REGIMENT**). Three or four brigades comprise an army corps, under command of a major-general. See **ARMY**.

BRIG'ANDAGE, the system of robbery by bands of men in secluded spots on highways or in mountains. It is of very ancient origin, but it has always flourished especially in loosely governed countries. In British history the most celebrated brigand was Robin Hood, and in later times Dick Turpin, while in Germany the so-called robber barons attained special fame. For years they practically held the southern part of the country at their mercy and were not effectually crushed until after the Thirty Years' War. Spain has always been a particularly favorable field for outlaws, of whom Don José Maria, whose name is perpetuated in Merimee's *Carmen*, was probably the most famous. In more recent times the brigands have prospered more especially in Italy, where Fra Diavolo, the monk bandit, practiced his profession.

In very recent times a peculiar type of brigandage, combining patriotism and robbery, has grown up. It was brigands of this class who kidnaped Miss Ellen Stone and her companion in 1901 in Macedonia and held them for a large ransom, which was finally paid by the United States. It was plain that these brigands were the close allies, if not paid agents, of the famous Macedonian committee, which was seeking to secure the independence of the country and used this method of securing funds. Brigandage in the United States was quite uncommon until the advent of Western railroads, when train-robbery engaged profitably the attention of outlaws, most famous of whom was Jesse James. Later outlaws found a field for their exploits in bank-robbery; the most recent form of brigandage is that of kidnapping (which see).

BRIGHT, JOHN (1811-1889), an English orator and statesman, identified with the free-trade and other democratic movements

of his country. He first became known as a leader in the Anti-Corn-Law League (see CORN LAWS). In 1843 he was chosen a member of Parliament for Durham, and there he distinguished himself as a strenuous advocate of free-trade and reform. He was in 1857 returned for Birmingham, and soon afterward he made speeches against the policy of great military establishments and wars of annexation. During the American Civil War he was one of the few English statesmen who were outspokenly in favor of the Union cause. In 1865 Bright took a leading part in the movement for the extension of the franchise and strongly advocated the necessity of reform in Ireland. He was, however, opposed to Home Rule for Ireland, and thereby lost the regard of Gladstone, to whom he was deeply attached. Bright remained prominent in public life until the year of his death.

BRIGHTON, *brī'ton*, ENGLAND, a maritime town in the country of Sussex, forty-seven miles south of London. In front of the town is a massive sea wall, with a promenade and drive over three miles in length, one of the finest in Europe. Brighton has no manufacturers, but it is especially famous as being the most fashionable watering-place in England. Londoners go there in such numbers that the place is sometimes called "London-by-the-Sea." It owes its rise to the favor shown it by George IV, when Prince of Wales. Population, 1931, 147,427.

BRIGHT'S DISEASE, a name given to various forms of kidney disease. The urine in such cases contains albumen and is of less specific gravity than usual. The common form of the disease was first described by Dr. Richard Bright in 1827. Anaemia and dropsy are typical symptoms, and in the final stages convulsions usually occur. People with chronic Bright's disease sometimes live for several years, as the disease may be held in check by hygienic measures. A warm, healthful climate is a great advantage. Any noticeable disorder of the kidneys or their functions should have the prompt attention of a reliable physician; there may be danger in delay.

BRIMSTONE, a name for sulphur. In purifying sulphur it is customary to melt it in a closed vessel, permit it to settle, and then pour it into cylindrical molds. In these it becomes hard, and is known in commerce as *roll brimstone*. See SULPHUR.

BRISBANE, *briz'bayn*, ARTHUR (1864-1936), an American newspaper editor, said to be the highest-salaried journalist in the world. He entered the newspaper field as London correspondent of the New York *Sun*, then became editor of its evening edition, and later for seven years was managing editor of the New York *World*. In 1897 he joined the staff of William Randolph Hearst (which see), as editor of the New York *Journal*. His sphere widened as Hearst acquired many newspaper properties, for Brisbane's editorials went to numerous Hearst daily papers. By many people he was considered an illogical writer, preaching class doctrines and appealing mainly to those who believe everything they see in print; others saw in his editorials panacea for many public ills. He was a master of short, pithy sentences, and insisted that his paragraphs should contain but few lines each, no matter how long an article might be. He was the author of *Mary Baker Glover Eddy*, a biography.

BRISBANE, AUSTRALIA, the capital of Queensland, is a well-built, prosperous city twenty-five miles from the mouth of the Brisbane River and 500 miles north of Sydney. The place is a center of the wool trade, and has regular steamship connection with European and Australian ports. Boot and shoe making, soap manufacture, brewing and tanning are included among its industries, and the city has two cathedrals, four parks, a university and several other educational institutions. Brisbane is the outgrowth of a penal colony established in 1824, but this status was abandoned, after which (1842) the town became a civil community, and was permanently named for its first governor. Population, 1933, 334,000.

BRISTLES, *bris's'lz*, the stiff, coarse, glossy hairs of the hog and the wild boar, especially the hair growing on the back. They are extensively used by brushmakers, shoemakers and saddlers. The American market is supplied in part by the meat-packing houses, but importations are large, and foreign bristles are of better quality. Because bristles may contain the germ of anthrax, inspection is imposed. See BRUSH.

BRISTOL, CONN., founded in 1728, incorporated as a city in 1911, and named for Bristol, Eng., is eighteen miles southwest of Hartford, on the New York, New Haven & Hartford, which reached the town in 1849. The fifty manufacturing establishments em-

ploy thousands of people; chief among these may be named a ball-bearings factory, a clock factory, a silver plate works and a manufactory of fishing rods. The airport is privately operated. There are three banks, a hospital, a library and eight parks containing 275 acres. Population, 1920, 20,620; in 1930, 28,451.

BRISTOL, ENGLAND, a cathedral city situated at the junction of the rivers Frome and Avon, partly in Gloucestershire, partly in Somersetshire, but forming a county in itself. It is one of the oldest cities in England, having existed before the Roman invasion. John Cabot sailed for the New World from Bristol in 1497, and traders from the place helped to colonize Newfoundland.

The town is built partly on low grounds, partly on eminences, and has some fine suburban districts, such as Clifton, on the opposite side of the Avon, and connected with Bristol by a suspension bridge 703 feet long and 245 feet above high-water mark. The most notable public buildings are the cathedral, founded in 1142, the Church of Saint Mary Redcliff, said to have been founded in 1293 and perhaps the finest parish church in the kingdom, the guild hall, the museum and the library. Bristol has glass works, potteries, soap works, tanneries, sugar refineries, chemical works, ship-building yards and machinery works. Coal is worked extensively within the limits of the borough. The export and import trade is large and varied, and the city is one of the most important ports of Great Britain, as well as a leading cattle market. There is a harbor in the city itself, and the construction of new docks at Avonmouth and Portishead gave a fresh impetus to the trade. Population, 1931, including Clifton, 396,918. It was then the seventh largest city in England.

BRISTOL, R. I., founded in 1680 and named for Bristol, Eng., is fifteen miles southeast of Providence, on Narragansett Bay and on the New York, New Haven & Hartford Railroad. It is a yacht-manufacturing center; rubber goods and woolen are also made, and employ hundreds of laborers. The town common contains twenty acres. Population, 1930, 11,933.

BRISTOL, TENN., and **BRISTOL, VA.**, is a city almost exceptional in America, for it lies in two states, the main street being the dividing line. The Tennessee section is

in Sullivan County; the Virginia part, in Washington County. Two city governments are required, but in other respects the community is one city. The railroads are the Southern and the Norfolk & Western. Educational institutions include Sullins College, Virginia Intermont College, and King College; there are two senior high schools, and an auditorium seating 1,250 people. The city has a radio station and an airport. About 50 factories employ 3,000 workers. Population, 1930, 20,845; 12,005 are in Tennessee, and 8,840 in Virginia.

BRISTOL CHANNEL, an arm of the Irish Sea, indenting the coast of Great Britain between Wales and the southern peninsula of the island. It is about eighty miles long, and varies in width from five to fifty miles, having a shore line of 220 miles. It receives the waters of the Usk, Wye, Severn, Avon and several other rivers. The channel is noted for its high tides, which in the narrowest places sometimes rise forty feet. Lundy Island is situated at the entrance.

BRITISH AMERICA, a term sometimes applied to the British possessions in the Americas. In its widest sense it embraces Canada and Newfoundland, British Guiana, British Honduras, the Bermudas, the British West Indies and the Falkland Islands. In a narrower sense it refers to British territory north of the United States. The term is little used at the present time.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, a society organized in 1831, mainly through the exertions of Sir David Brewster, whose object was to assist the progress of discovery and to disseminate the latest results of scientific research, by bringing together men eminent in all the several departments of science. Its first meeting was held at York on September 26, 1831. Since then it has met annually in different parts of the United Kingdom and twice in Canada, in Montreal in 1884 and Toronto in 1897. The sessions extend generally over about a week. The society is divided into sections, which, after the president's address, meet separately for the reading of papers and for conference. Lectures and other general meetings are usually held each evening during the meeting of the association. The yearly revenue of the association is more than sufficient to meet its expenses, and the surplus is appropriated for the pursuit of various lines of

scientific investigation. It is the oldest existing society for scientific investigation in the British Commonwealth of Nations.



BRITISH COLUMBIA, the westernmost province of the Dominion of Canada, stretching northward from the United States boundary along the Pacific Ocean to Alaska, then to the east of Alaska to Yukon Territory. Its length from north to south is 740 miles, and its greatest length from east to west, 620 miles. The area, including islands, is 355,855 square miles, or larger than that of California, Washington and Oregon combined.

Until 1912 it was Canada's largest province, but in that year the extended boundaries of Quebec and Ontario made it third in size. Out of every 1,000 of the population, 555 are males, and 445 are females. The 1931 census figures revealed a population of 694,263, including 490,000 of British birth or descent, 24,500 Indians (natives), 22,000 Japanese, 1,500 Hindus, and 27,000 Chinese. Since 1923 the Federal government has excluded all Chinese except medical students. By a "gentlemen's agreement" only 150 Japanese a year may enter. There are 33,000 Scandinavians, 17,000 Germans, 115,000 French, and 12,000 Italians.

The Land. The Rocky Mountains extend through the entire province from north to south. In the southern part they are 450 miles wide; in the northern part they narrow to about 325 miles. At the south their average elevation is about 10,000 feet; in the north 5,000 feet. The highest peak in the province is Mount Fairweather (15,287 feet). Through numerous passes the rivers reach the sea and the railroads run to coast cities. The most famous of these are Crow's Nest Pass and Kicking Horse Pass, which are utilized by the Canadian Pacific Railroad, and Yellowhead Pass, crossed by the Canadian National Railway.

Minor chains of the Rocky Mountains system are the Purcell and the Selkirk mountains, the Gold Range and the Coast Range. Along the coast hundreds of fiords give the shore line an appearance resem-

bling that of Norway. These are so irregular that British Columbia has a shore line of nearly 7,000 miles.

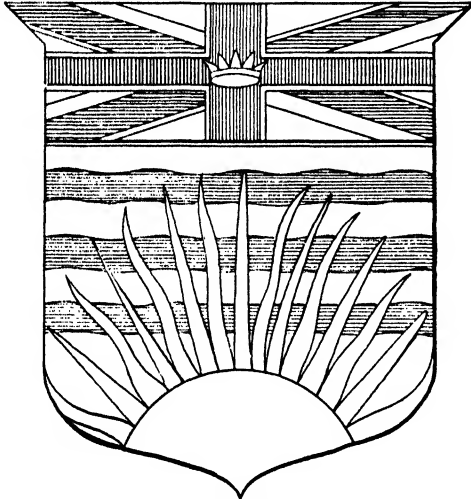
Drainage. The principal rivers are the Columbia, which drains the southeastern portion, the Fraser, which traverses the province for a distance of 695 miles, and the Skeena and Stikine, all of which flow into the Pacific and are navigable for large boats in the lower parts of their courses. The northeastern portion of the province is drained by the Peace and the Liard rivers, which find an outlet through the Mackenzie. Between the mountain ranges are a number of long, narrow lakes, which are really expansions of the rivers. The most important of these are Okanagan, Arrowhead and Kootenay. The surrounding mountains have altitudes ranging from 8,000 to 10,000 feet and are covered with snow throughout the year.

Climate. British Columbia has on the whole a milder climate than other provinces in the same latitude. This is due to the warm winds which blow from the Pacific and along the coast and for some distance into the interior. At Vancouver the yearly temperature ranges from about 37° to 60°. East of the Coast Range there is greater difference between summer and winter, and the eastern portion of the province has extremely cold winters and hot summers. The rainfall varies greatly from the coast inland. The Coast Range deprives the winds of much of their moisture, and upon the western slopes of these mountains the annual rainfall varies from 115 inches in the northern part to thirty-two inches at Victoria, while in the valleys in the interior it is about 15 inches. Lofty ranges of the Selkirks and the Rocky Mountains deprive the atmosphere of still more moisture, and the winters in this region are characterized by deep snows, which remain upon the mountains throughout the year and furnish the source of most of the streams that rise in that locality.

Agriculture. Wherever the surface makes agriculture possible the soil is fertile; the plains and valleys are well adapted to wheat, other cereals and fruit, but agricultural development naturally has to proceed near lines of transportation. The entire province south of 52° and east of the Coast Range up to 3,500 feet is a grazing country, and a farming country where irrigation is possible.

These fertile lands south of 52° contain about 3,000,000 acres; north of that latitude are three times as many acres largely developed. The province leads Canada in apples and pears. Oats is the largest cereal crop; wheat is second, and there is considerable barley and rye.

Minerals. The mineral production of British Columbia exceeds \$40,000,000 a year. Gold accounts for \$14,00,000, while copper, lead, and zinc have a value of about \$21,000,000. British Columbia leads Canada in lead, silver, and zinc, and has in the Sullivan mine the world's largest zinc producer. In eight years Pioneer gold mine has yielded \$11,000,000. At Britannia Beach there is located one of the province's largest copper mines.



COAT OF ARMS OF BRITISH COLUMBIA

The Union Jack at the top, with the ancient crown of England blazoned in gold over the center, represents the unity of British Columbia with the British Empire and its allegiance to the Crown. The golden setting sun symbolizes the position of the province as the westernmost part of the Dominion, and the wavy bands of blue represent the sea, symbolic of the province's maritime importance.

Forests. The forest area is estimated at more than 190,000 sq. mi., including sparsely timbered lands. The stand of merchantable timber is estimated by the Chief Forester of the province at over 53,500 sq. mi.; the most important tree is the Douglas fir. It is claimed that the British Columbia climate can produce as much timber in sixty years as can be grown elsewhere in Canada in a

century. British Columbia contains more than half the standing commercial timber in Canada, and had a record export of almost 900,000,000 feet in 1935; not every year is such a record possible.

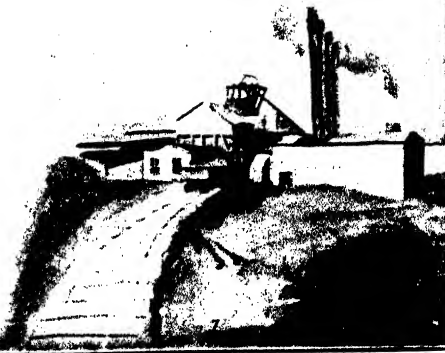
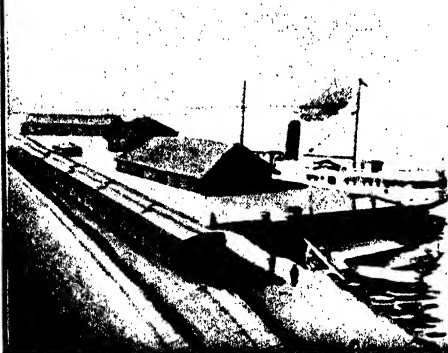
Fisheries. The shore line extends nearly 7,000 miles, with a protected territory of nearly 30,000 square miles, abounding with commercial fish. These include salmon, herring, sturgeon, halibut, pilehard, oolachans, smelts, flatfish, black cod, perch, trout, sardines, anchovies, shad, oysters, crabs, shrimps, clams. The industry is capable of enormous expansion. In 1935 17,000 men were employed, and the catch was valued at \$15,786,000. The annual value of the catch is likely to vary several million dollars.

Transportation. The rivers, referred to above, were important means of transportation in early days, but the need of railroads was keenly felt. When British Columbia was invited to join the Dominion it pledged itself to do so on the condition that it should be given a railroad to the east across the continent. The mutual pledge was kept by the construction of the Canadian Pacific, which reached the coast at Vancouver in 1885. The Grand Trunk Pacific was the second line to cross the prairies and mountains; its terminus was reached in 1915 at Prince Rupert. The Canadian Northern first operated its lines from Quebec to Vancouver in the same year. Owing to financial stress, all of these roads excepting the Canadian Pacific were merged in the years 1919 and 1920 into the government controlled Canadian National Railways. See the article RAILROADS IN CANADA, in these volumes. There are 4,097 miles of railroad in the province, including 350 miles of the Pacific Great Eastern, which belongs to the provincial government.

Education. Education is carried on as a regular department of the Government. At the head is the Minister of Education and he is assisted by a Superintendent of Education and other officers. There are normal schools at Victoria and Vancouver; in 1915 the University of British Columbia, a state institution in Vancouver, began its work. It has a junior college in Victoria.

Government. The chief executive, who represents the king, is the Lieutenant-Governor, appointed for five years by the Governor-General of Canada in Council. He governs through the advice and assistance of the Ex-

BRITISH COLUMBIA



1. Apples.
2. Unloading Salmon.

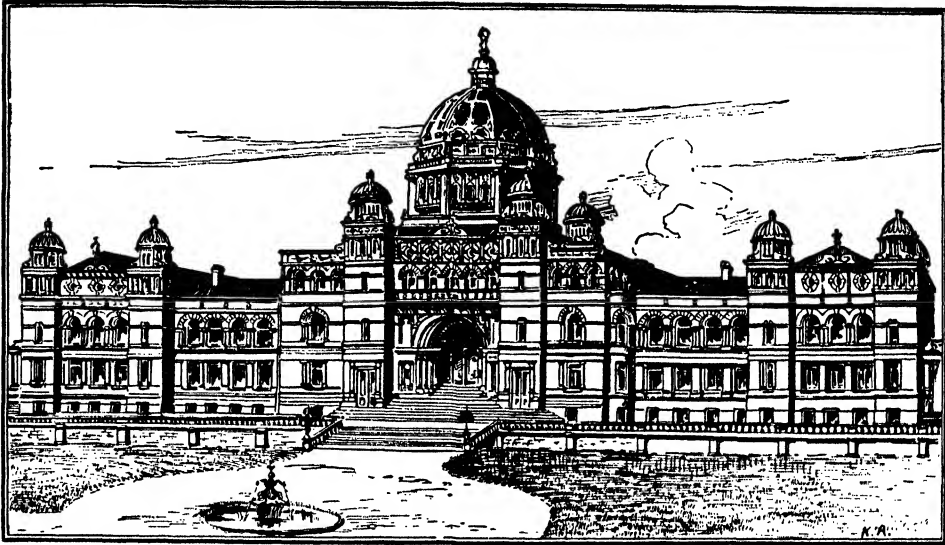
3. Grapes.
4. Lumbering.

5. Twin Falls.
6. Docks and Harbor of Prince Rupert.

7. Smelter.

ecutive Council, or Cabinet, headed by the Prime Minister, and numbering eight to twelve members. The Cabinet is chosen from and is responsible to the Legislative Assembly of forty-eight members. To the Dominion government British Columbia sends six senators, appointed for life by the Fed-

trader, Simon Fraser, reached the mouth of the river that bears his name, in 1808. Fur was king in this land, which was christened New Caledonia; for more than twenty years Dr. John McLoughlin of the Hudson's Bay Company ruled from California to Alaska. When American settlers came overland on the Ore-



BRITISH COLUMBIA LEGISLATIVE BUILDINGS

eral government, and sixteen members of the House of Commons.

Cities. The chief cities of the province are in order of size, Vancouver, Victoria (the capital), New Westminster, North Vancouver, Trail, Nanaimo, Prince Rupert, Kamloops, and Nelson.

History. Though the viceroy of New Spain (Mexico) sent an expedition in 1774 which explored the coast of British Columbia as far as Queen Charlotte Islands, it was the voyage of Captain James Cook in 1778 that attracted traders' attention. By 1786 six vessels were trading for otter skins, and in alarm the Spaniards seized a post at Nootka Sound in 1789, claiming all the coast to Alaska. Britain and Spain narrowly escaped war, but Spain lacked allies, and in 1792 Captain George Vancouver arrived to take over the disputed territory. In two years he charted much of the coast, and was the first to circumnavigate Vancouver Island.

Sir Alexander Mackenzie, a fur trader, was the first man to cross the Rocky Mountains and reach the ocean (1793). Another

gon Trail, the Company knew that the joint occupation of the country agreed upon in 1818 by the United States and Great Britain was doomed. Its headquarters were moved from Fort Vancouver on the Columbia River to Fort Victoria on Vancouver Island. The Oregon treaty of 1846 kept Vancouver Island British.

The Crown leased Vancouver Island to the Company in 1849, and its chief factor, James Douglas, also became governor of the colony. The first British assembly west of the Great Lakes met in 1856. Two years later the gold rush on the mainland caused its creation as the colony of British Columbia; the two were united in 1866. In 1871 British Columbia joined the Dominion, with the promise of a railway link with East Canada within ten years. It also received responsible government. Not until 1885 was the Canadian Pacific Railway completed. Its entry into Vancouver (1887) and the opening of the Panama Canal (1914) were the chief factors in making Vancouver the third largest city in Canada.

Items of Interest on British Columbia

The area of British Columbia is twenty-two times that of Switzerland and more than five times that of the state of Washington.

It is essentially a mountainous region, the two great chains, the Cascade or Coast Range and the Rockies, covering a large part of the area.

Between the two ranges is an elevated tract of hilly country known as the "interior plateau."

Vancouver Island and the Queen Charlotte Islands are remnants of still another range, which ran parallel to the coast, but is now submerged.

The average altitude of the Rockies at the United States boundary is 8,000 feet.

The highest pass over the Rockies is the South Kootenay, or Boundary Pass, 7,100 feet.

The partially submerged valleys of the Coast Range form the many harbors and sounds which are characteristic of the coast. The coast line, including all inlets, is over 7,000 miles long.

On the southwestern side of the Rockies is a great valley in which the Kootenay, Columbia, Fraser, Finlay and other rivers have their upper courses; the northern part of the province is drained by tributaries of the Mackenzie and the Yukon.

In the southern half of the province July is the month of least and December of greatest rainfall.

The mean temperature for the year is about 47° Fahrenheit.

About 340 species of birds are found.

Apples are the principal fruit, but peaches, apricots, almonds, small fruits and grapes are being successfully cultivated.

The Canadian Pacific owns two large lines of steamships running from Victoria and Vancouver.

The province formerly had two colleges, McGill University College of British Columbia at Vancouver, one of the branch colleges of McGill University at Montreal, and Victoria College at Victoria affiliated with McGill University.

One has been absorbed and the other affiliated by the provincial university at Vancouver.

There are 61 Indian schools, with an average attendance of more than 2,000.

The population increased from 524,582 in 1921 to 694,263 in 1931, an increase of 13.3 per cent.

The average density of population, per square mile, is less than that of any other province.

A graduated income tax is in force.

Geographical explorations of the Pacific coast began with Cook's voyage in 1778.

Vancouver surveyed almost the entire coast of the present province.

Prohibition was in effect during the World War. In 1921 a new law was passed by which liquor is placed under government control.

British Columbia joined the Confederation in 1871, one of the conditions being that the Canadian Pacific should be finished by 1881, but completion was actually postponed until 1885.

Questions on British Columbia

What is the area of British Columbia? How does it compare with Switzerland? With the United Kingdom?

What is the character of the surface?

Name the two great mountain chains and three of the highest mountain peaks.

How was Vancouver Island formed?

How long is the coast line?

What are the common wild animals found in the province?

Which are the principal rivers? In what direction do they flow?

What is the principal industry?

What is the importance of the mining industry in British Columbia as compared with the rest of Canada?

What other minerals are important?

What is the principal product of the fisheries?

How do the fisheries of British Columbia rank?

Related Articles. Consult the following titles for additional information:

Cascade Range	New Westminster
Columbia River	Prince Rupert
Esquimalt	Revelstoke
Fraser River	Robson, Mount
Hudson's Bay Company	Rocky Mountains
Juan de Fuca	Saint Elias Mountains
Kamloops	Selkirk Mountains
Kootenay River	Vancouver
Nanaimo	Vancouver Island
Nelson	Victoria

BRITISH COMMONWEALTH OF NATIONS. With their growth in population, wealth, and political strength, the important colonies of Great Britain, already in many respects masters of their own destinies, became in 1926 free and equal with the mother country. In the Imperial Conference of that year, held in London, the dominions of Canada, Australia, New Zealand and Newfoundland, and the Union of South Africa and the Irish Free State, under the name British Commonwealth of Nations, were released from the political ties that subjected them to the will of the British government, and they were elevated to equality with Great Britain in the family of British nations.

The action was not precipitate. It did not inaugurate an abrupt change in policy, for self-determination had been growing in each of these units of the Empire for years. The action of the Imperial Conference recorded the Empire's assent to conditions whose approval had been regarded as inevitable for more than two decades. While the Imperial Conference laid down the principles of the new Commonwealth, not until 1931 was the final pronouncement made. In that year the British Parliament, by enacting the Statute of Westminster, abolished the last remnant of its control, thereby making the dominions separate governments, united to Great Britain and to each other by a common king.

The position of these self-governing units of the Empire was clearly set forth in the following words: "They are autonomous communities within the British Empire, equal in status, in no way subordinate one to another in any respect of their domestic or external affairs, though united in a common allegiance to the Crown, and freely associated as members of the British Commonwealth of Nations."

Newfoundland, because of a financial crisis, relinquished temporarily in 1933 some of its Commonwealth prerogatives.

BRITISH EAST AFRICA, a term applied to the British possessions in the eastern part of Africa, in a general way, but no

longer of special significance. It referred particularly to that part of the continent that is now Kenya Colony and Protectorate, Uganda, and Zanzibar.

BRITISH EMPIRE, the greatest of modern empires, so extensive that it can be said without exaggeration that there is no time when the sun is not shining on some part of it. The nucleus of this vast empire, which covers almost one-fourth of the land surface of the globe, is the island mass of England, Scotland and Wales, which with Northern Ireland (since 1922) forms the United Kingdom. More than 450,000,000 people are under the protection of the British flag, and if the different parts of the empire could be brought together they would form a continent containing over 13,000,000 square miles, or one a little larger than the whole of Africa.

[The British Empire is not the only land on which the sun never sets. When its last rays are falling on the Pacific Islands of the United States, its morning rays touch the eastern coast of Maine.]

Interest in the British Empire was sharply intensified after the outbreak of the World War, chiefly because the world saw the spectacle of scattered portions of a vast domain magnificently loyal to the home government. Certain discontented elements in South Africa, in India and elsewhere, it is true, tried to cause trouble, but in the main the subjects of the British sovereign the world over gave their treasure and their blood for the preservation of the empire.

The subjects of the British Empire vary from primitive savages to the most advanced peoples of the globe. It is obvious, then, that the methods of controlling and governing the different possessions vary considerably. Many of the African possessions are *protectorates*, with native officials ruling under British advice and protection. Another important class embraces the *colonies*. Canada, Australia and South Africa are examples of *self-governing* commonwealths, with legislative bodies to pass all laws pertaining to their affairs. Another kind is the *crown colony*, whose officials are under direct control of the British government. There are, besides, several territories known technically as *dependencies*, and the Empire of India. See **BRITISH COMMONWEALTH OF NATIONS**, above.

The table on page 566 gives all the parts of the empire as they exist at this time. The

population figures in many instances are estimates, as exact statistics cannot always be obtained:

interior, and exist in a condition bordering upon savagery. The soil is the chief source of wealth; it is very rich and produces

LOCATION	AREA IN SQUARE MILES	POPULATION (000 OMIT- TED)	LOCATION	AREA IN SQT ARE MILES	POPULATION (000 OMIT- TED)
Great Britain and Northern Ireland	94,633	46,056	Nigeria	335,700	19,928
Europe			Gambia	4,134	200
Irish Free State	27,000	2,972	Gold Coast and Prot.	80,000	3,123
Gibraltar	2	21	Sierra Leone and Prot.	31,000	1,542
Malta	122	244	Anglo-Egyptian Sudan	1,014,000	5,606
Asia			Tanganyika Terr.	365,000	5,063
Aden, Perim, &c.	9,000	48	S. W. Africa	332,400	262
Barain Islands	250	100	Cameroon	31,000	775
Borneo, Brunei and Sarawak	77,106	775	Togoland	12,600	276
Ceylon	25,332	5,313	America		
Cyprus	3,584	348	Bermudas	19	28
Hong Kong	391	840	Canada	3,729,665	10,377
India	1,805,332	352,838	Falkland Islands and South Georgia	5,618	2
Straits Settlements	1,600	1,114	British Guiana	89,480	312
Fed. Malay States	27,648	1,713	British Honduras	8,598	51
Other Malay States	23,486	1,198	Newfoundland and Labrador	162,734	277
Palestine	9,000	1,035	Bahamas	4,404	60
Africa			Barbados	166	174
Kenya Colony and Prot.	212,000	3,041	Jamaica	4,431	1,054
Uganda Prot.	110,300	3,554	Leeward Islands	715	128
Zanzibar	1,020	235	Trinidad	1,974	413
Mauritius and Dep.	809	393	Windward Islands	516	174
Nyasaland Prot.	37,890	1,501	Australasia		
St. Helena and Ascension	81	4	Australian Common- wealth	2,974,581	6,500
Seychelles	156	27	Papua	90,540	277
Somaliiland Prot.	68,000	345	New Zealand	104,751	1,525
Basutoland	11,716	498	Fiji	7,083	186
Bechuanaland Prot.	275,000	153	Pacific Islands	11,450	265
Southern Rhodesia	149,000	1,109	Terr. of New Guinea	89,252	404
Northern Rhodesia	288,000	1,386	Western Samoa	1,250	46
Swaziland	6,704	113	Nauru	10	2
Union of South Africa	472,347	6,929		13,070,426	492,932

Related Articles. For descriptions of the various possessions of Great Britain see articles on the more important geographical divisions here listed.

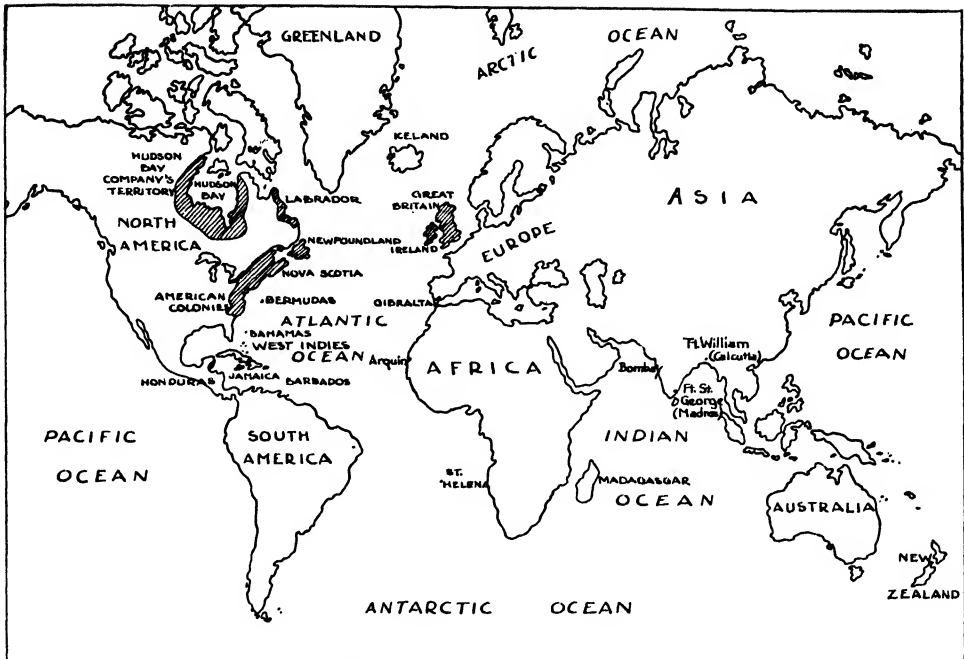
BRITISH GUIANA, from 2° to 7° north of the equator, is the only possession of Great Britain on the South American continent, and one of three of its political divisions that are not independent republics. The other two are Dutch Guiana (Surinam) and French Guiana. It is located on the Atlantic shore of the continent, and contains 89,480 square miles. Dutch Guiana is east, Brazil is south, and Venezuela and Brazil are west. It is larger than the combined areas of Dutch Guiana and French Guiana. The capital is Georgetown (which see); the population, 312,490 (1931).

The people, in addition to the white men who conduct the plantations, are largely negroes from the East and West Indies. There are perhaps 15,000 natives who are uncivilized. These live in the unexplored

sugar cane, rice, coffee and sea-island cotton in abundance. Ten million dollars worth of these products are exported every year. The forests are largely unexplored, but they contain many valuable woods. There is some gold, but the mines have been worked but little.

The first Europeans to hold this territory were the Netherlanders, who occupied it in 1613. The English acquired it in 1815 by treaty. (See map, SOUTH AMERICA.)

BRITISH HONDURAS, or **BELIZE**, *be leez'*, a crown colony of Great Britain, in the northeastern corner of Central America, with an area of 8,598 square miles and a population of 45,317 in 1921, males and females being almost equal in number. It is the only division of Central America which is not independent. The climate is



The British Empire when George I came to the throne (1714)



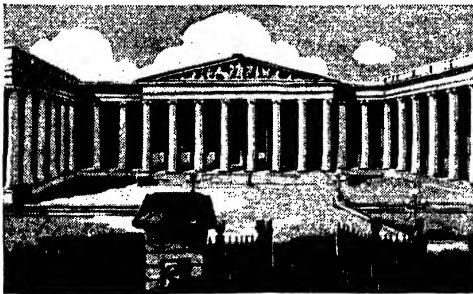
The British Empire when Victoria came to the throne (1837)

hot and moist. Its chief source of wealth is its forests of mahogany and cedar. Besides, there is large production of bananas, cocoanuts, chicle and logwood. The colony is in charge of a governor, who is assisted by an executive council of six members and a legislative council of twelve members.

Spain made early attempts to colonize and control this territory, but in 1783 all disputes were settled by treaty and England's sovereignty was recognized.

BRITISH ISLES, the archipelago off the western coast of Europe, surrounded by the British Channel, the Strait of Dover, the North Sea and the Atlantic Ocean. It includes the island of Great Britain, which is made up of Scotland, England and Wales; Ireland, the Hebrides, the Orkneys and the Channel Islands.

BRITISH MUSEUM, a great national museum in London, which contains many of the world's priceless treasures. It was founded by Sir Hans Sloane, who, in 1753, bequeathed his various collections, including 50,000 books and manuscripts, to the nation, on the condition of \$100,000 being paid to his heirs. Montague House was appropriated for the museum, which was first opened on January 15, 1759. The original edifice having become inadequate, a new building in Great Russell Street was resolved upon in 1823, but was not completed till 1847. In 1857 a new library building was completed and opened at a cost of \$750,000. It contains a circular reading room 140 feet in diameter, with a dome 106 feet in height.



BRITISH MUSEUM

This room has accommodation for 200 readers comfortably seated at separate desks, which are provided with all necessary conveniences. More recently, the accommodation having become again inadequate, it was resolved to separate the objects belonging to the natural history department from the rest,

and to lodge them in a building by themselves. Accordingly, a large natural history museum has been erected at South Kensington, and the specimens pertaining to natural history, including geology and mineralogy, have been transferred thither, but they still form part of the British Museum. Further additions to the Great Russell Street buildings were made in 1882, and again in 1888.

The museum is under the management of forty-eight trustees. It is open daily, free of charge. Admission to the reading room as a regular reader is by ticket, procurable on application to the chief librarian and by complying with certain simple conditions. The library, which is now the second largest and one of the most valuable in the world, has been enriched by numerous bequests and gifts, among others the library collected by George III during his long reign. A copy of every book, pamphlet, newspaper, piece of music, etc., published anywhere in British territory, must be conveyed free of charge to the British Museum.

The museum contains eight principal departments, namely, the department of printed books, maps, charts, plans, etc.; the department of manuscripts; the department of natural history; the department of Oriental antiquities; the department of Greek and Roman antiquities; the department of coins and medals; the department of British and medieval antiquities and ethnography, and the department of prints and drawings. The total number of persons using the reading-rooms each year is about 200,000, and the annual number of visitors, exclusive of readers, is about 700,000. Among the interesting possessions of the museum are the celebrated Elgin Marbles (which see), and the Egyptian Rosetta Stone.

BRITISH NORTH AMERICA ACT, an act passed by the British Parliament in March, 1867, under which the provinces of Canada were organized as the Dominion of Canada. On the following first of July it went into effect. Upper and Lower Canada were divided and named Ontario and Quebec; Nova Scotia and New Brunswick retained their names. Provision was made for the admission of new provinces which might later be formed. See CANADA.

BRITISH SOMALILAND. See SOMALILAND.

BRITISH WEST INDIES, *in'diz*, those islands of the West India group which be-

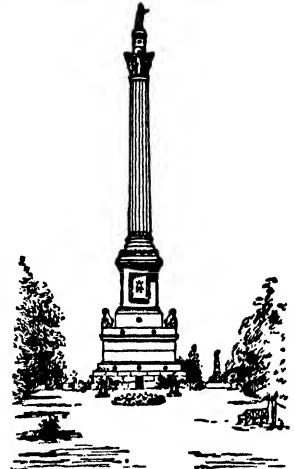
long to Great Britain. They include the Bahamas, Barbados, Jamaica, the Windward and the Leeward islands, Trinidad, Tobago and a large number of smaller islands. The British West Indies are fertile and productive, producing sugar, fruit, vegetables, cereals, lumber and spices. For the most part they possess attractive scenery, and the tropical climate, modified by the sea breezes, is wholesome for whites and blacks alike. The islands are divided for governing purposes into crown colonies, ruled by governors appointed by the English sovereign, and colonies with a limited degree of self-government. The population of the islands is estimated at about 1,680,650. See WEST INDIES.

BRIT'TANY, or **BRETAGNE**, *bre tah'n'y*, a peninsula projecting into the Atlantic Ocean between the British Channel on the north and the Bay of Biscay on the south, and forming the extreme western portion of France. Brittany is a favorite resort of tourists because of its picturesque charm, and the name occurs frequently in song and story. The land is supposed to have taken its name from the ancient Britons, who sought refuge here when driven from the island of Britain. Formerly an independent kingdom, then a duchy of France, it is now a French province, and is subdivided into five departments.

The soil is rather poor, and only meager crops are grown. Of these, corn, grapes and other fruits are the most important. The inhabitants along the coast engage in the manufacture of salt; and coal, lead and iron are found in small quantities in the interior. The fisheries are quite important. Many relics of the early inhabitants are found throughout the country, and the native peasantry retain their ancient language, which closely resembles the Welsh, and their dress and customs. See FRANCE.

BROCADE, *bro kade'*, a form of silk goods enriched with raised flowers, foliage or other ornaments. The term is restricted to silks figured in the loom, distinguished from those which are embroidered after being woven. Brocade was manufactured in Oriental countries at an early date, and in Europe as early as the thirteenth century. At the present time it is utilized as a cloth for expensive upholstering, draperies and royal robes, and is popular for its decorative effects.

BROCK, SIR ISAAC (1769-1812), a British soldier, hero of a battle of the War of 1812. He became lieutenant in 1790, served in the West Indies, in Holland and at the Battle of Copenhagen, and in 1802 went to Canada, where he suppressed a troublesome conspiracy. In 1810 he commanded the troops in Upper Canada and became lieutenant-governor of that province. General Brock moved his command to Detroit in 1812, and in August he captured General Hull with his entire army. Meanwhile, a United States force was gathered on the frontier of Niagara, and in his attack on this force General Brock fell. A magnificent monument in his honor has been erected at the spot where he was killed.



BROCK MONUMENT AT
QUEENSTON

BROCKTON, Mass., was founded in 1700 and incorporated in 1821, under the name of North Bridgewater. In 1874 the present name was adopted, and a city charter was granted in 1881. It is the principal city of Plymouth County, twenty miles south of Boston, on the New York, New Haven & Hartford Railroad; there is an airport. Electric lines reach neighboring towns in all directions. Brockton is the leading shoe-manufacturing city of the United States, many thousands of persons being employed in this industry; there are more than 200 other industrial establishments. The city has 400 acres in parks and playgrounds, notable public buildings, a Carnegie Library, and nearly a dozen fraternal orders that own their buildings. Population, 1930, 63,797.

BROCKVILLE, ONT., the county town of Leeds County, situated on Lake Ontario at the outlet of the Saint Lawrence River, 126 miles southwest of Montreal. The city is served by two great railway systems, the Canadian Pacific and the Canadian National, and it is a port of call for Saint Lawrence steamers. Among the products manufac-

tured in Brockville are stoves and hardware, woolen goods, patent medicines, hats, gloves and suspenders, agricultural implements, engines and motor boats. Two lumber companies operate here, and the place is the headquarters of the Eastern Ontario Dairy-men's Association. It is visited by tourists and sportsmen who come to enjoy the beautiful scenery and good fishing facilities. Brockville was named in honor of Sir Isaac Brock. Population, 1931, 9,736.

BROKER, an agent who is employed to conclude bargains or transact business for others, in consideration of a charge or compensation which is usually in proportion to the extent or value of the transaction completed by him, and is called his *commission* or *brokerage*. In large mercantile communities the business of a broker is usually limited to a particular class of transactions, and each class of brokers has a distinctive name, as *bill broker*, one who buys and sells bills of exchange for others; *insurance broker*, one who negotiates between underwriters and the owners of vessels and shippers of goods; *ship broker*, one who is the agent of owners of vessels in chartering them to merchants or procuring freight for them from one port to another; *stock broker*, the agent of dealers in shares of joint stock companies, government securities and other monetary investments.

A broker differs from a commission merchant in that the latter has temporary possession of the goods which he sells, while the broker does not necessarily handle the goods or stock of his principals.

BROMFIELD, LOUIS (1896–), an American novelist and dramatist, native of Mansfield, O., was educated at Cornell and Columbia universities. He left school to serve in a French ambulance unit in the World War, receiving his degree (honorary) upon returning home; the French government bestowed on him the Croix de Guerre for distinguished service. His first book of note was *The Green Bay Tree* (1924); this was followed by *Possession*, then by *Early Autumn* (1926), which won the \$1,000 Pulitzer Prize of the year for the best American novel. Later books were *A Good Woman*, *The Strange Case of Miss Annie Spragg*, and *Twenty-Four Hours*. *The House of Women* (1927) was a play. His novels portray contemporary American life and contain considerable shrewd character study.

BROMIDES, *bro'midz*, compounds of bromine with silver, potassium and various other metals. Bromide of potassium, which is like common salt in appearance, is valuable to the photographer because it is employed in the manufacture of silver bromide. The latter is used in preparing films and sensitized plates. Bromide of potassium is prescribed to quiet excited nerves, but is not a safe medicine to use except on the advice of a physician. Other bromides used medicinally include those of ammonium, lithium, calcium and zinc.

BROMINE, *bro'min*, a nonmetallic element discovered in 1826. In its general chemical properties it much resembles chlorine and iodine, and it is usually associated with them. It exists, but in very minute quantities, in sea water, in the ashes of marine plants, in animals and in some salt springs, and is obtained as a by-product of the salt industry. At common temperatures it is a very dark reddish liquid, emitting a red vapor and having a powerful and suffocating odor. It has bleaching powers like chlorine, and it is very poisonous. Its density is about four and a half times that of water.

BRONCHIAL, *bron'ki al*, **TUBES**, a system of small tubes which branch out from the bronchi and penetrate the substance of the lungs. At the extremity of each of these tubes and opening into them are groups of tiny air cells, whose function is to supply the blood with oxygen and take from it carbon dioxide. The distressing cough known as bronchitis is caused by inflammation of the mucous lining of the bronchial tubes.

Related Articles. Consult the following titles for additional information:
 Bronchitis Breathing Lungs

BRONCHITIS, *bron ki'tis*, inflammation of the mucous membrane of the bronchial tubes (which see). It is of common occurrence, and may be either acute or chronic. Its symptoms are those of a feverish cold, such as headache, lassitude and an occasional cough, which are succeeded by a more frequent cough, occurring in paroxysms, a sputum of yellowish mucus and a feeling of great oppression on the chest. Slight attacks of acute bronchitis are frequent and not very dangerous. They may be treated with mustard poultices or fomentations, hot baths and laxatives. Acute bronchitis, however, may become a formidable malady and

requires prompt treatment. Its main symptoms are cough, shortness of breath and expectoration. It is particularly liable to attack a person in winter, and in the end it may cause death by preventing the lungs from doing their work and by causing other complications, such as pneumonia.

BRONTE, *bron'tā*, CHARLOTTE (1816-1855), an English novelist of the Victorian Period, whose best-known work, *Jane Eyre*, is considered one of the great novels of English literature. She was one of three talented sisters, daughters of an impoverished clergyman of Haworth, Yorkshire. Under the names of Currer, Ellis and Acton Bell, the three Brontë girls, Charlotte, Emily and Anne, published a volume of poems in 1846, and later each of them wrote a novel. Charlotte found no publishers for *The Professor*, her first attempt, but in 1847 her *Jane Eyre* was a sensational success. It is a stormy, passionate story, reflecting some of her own struggles and experiences. *Shirley* and *Villette*, appearing respectively in 1849 and 1852, are stories of considerable merit, though they lack the power of her greatest work. In 1854 Miss Brontë married her father's curate, the Rev. Arthur Nicholls, but she lived only a few months after her marriage. The story of the Brontë girls, as told by Mrs. Gaskell in her *Life of Charlotte Brontë*, is itself a fascinating tale.

BRONZE, an alloy of copper and tin in varying proportions, with occasionally the addition of small quantities of lead or zinc. The most common varieties of bronze in use are *gun metal*, used in making ordnance (see ARTILLERY; CANNON); *bell metal* (see BELL); *specular metal*, used for making mirrors and reflectors in telescopes; *statuary bronze*, used in sculpture; *aluminum bronze*, a composition of copper and aluminum, closely resembling gold, and *manganese bronze*, often called *white bronze*, a composition of iron and manganese with other bronzes. Gun metal contains nine parts copper and one part zinc. It is very hard and strong. Bell metal for large bells consists of three parts copper to one part tin, and for small bells, four parts copper to one part tin. Statuary bronze contains eight parts copper to two parts tin. Japanese bronzes contain quite a large proportion of lead, which makes them softer. They also contain some nickel, arsenic, silver and gold.

Bronze has been known from a very early

period of history. The Chinese and ancient Egyptians were familiar with it centuries before the Christian Era, and it is supposed that their early bronzes were produced by smelting the ores of the metals. Bronze is used for a great variety of purposes in the arts, also for ornamental work, such as railings and other structures. See BRONZE AGE.

BRONZE AGE, a term denoting the period or stage of culture of a people using bronze as the material for implements and weapons. As a stage of culture, the use of bronze comes between the use of stone and the use of iron. The Bronze Age is not an absolute division of time, but a relative condition of culture, which in some places may have been reached early, in others late; in some it may have been prolonged, and in others brief, or even, as in the Polynesian area, it may not have existed, in consequence of the people passing directly from the use of stone to that of iron.

How the ancients discovered that a small amount of molten tin mixed with molten copper would form a stronger substance than man had hitherto known can never be answered; but it was no doubt brought about by accident, for men of the period were not able to reason scientifically. The Bronze Age probably began as early as 2200 B. C., and possibly earlier; this approximate date is the best judgment of archeologists. The implements and weapons of the Bronze Age include knives, saws, sickles, awls, gouges, hammers, anvils, axes, swords, daggers, spears, arrows, shields. The composition of the bronze varied considerably, but in general it was about ninety per cent of copper to ten per cent of tin. See STONE AGE; IRON AGE.

BROOK FARM, an experiment in coöperative living which at different times had connected with it such distinguished Americans as Nathaniel Hawthorne, George W. Curtis, Charles A. Dana, Margaret Fuller and Ralph Waldo Emerson. It was founded at West Roxbury, Mass., in 1841, under the direction of George Ripley. All members, regardless of sex, were required to labor a certain period each day. The products being turned in to a common stock, from which all shared practically equally. The association was dissolved in 1847. Hawthorne's *Blithedale Romance* relates to Brook Farm.

BROOKLINE, MASS., reputed to be the wealthiest town in the world for its size, is

a residential suburb of Boston, almost surrounded by the greater city, and distant only three miles from the capitol building. It was a part of Boston in 1630, but was separately incorporated in 1705. The Boston & Albany Railroad serves the town, as well as the Boston system of street and elevated railways. From Corey Hill there is a fine view of the metropolitan district. Numerous small parks, magnificent residences and landscape effects beautify the town. The old town system of government is yet adhered to; there are five selectmen. Americans predominate. Population, 1920, 37,746; in 1930, 47,490.

BROOKLYN, *brook'lin*, N. Y., until 1898 a separate city of over a million people, but now one of the five boroughs of Greater New York—the Borough of Brooklyn—separated from the island of Manhattan by the East River. It was the largest city in the world ever to become a part of a greater city; at the time of its absorption it was the third largest city in the western world, and could still claim that distinction had it not lost its identity. In 1920 there were 2,018,356 people in the city; in 1930, 2,560,401.

Brooklyn has not entirely surrendered its individual fame; it is not completely eclipsed by the greater civic unit on Manhattan Island for it is a great manufacturing center, surpassed only by New York interests, Chicago and Philadelphia. The main part of the city, with its great water front, is in sharp contrast with its beautiful eastern section, stretching along Long Island. The latter is a fine residential section.

Three great bridges, the New York subway, ferry boats, and a railroad underground connect Brooklyn with Manhattan Island. For government, see NEW YORK (City).

BROOKLYN BRIDGE. See BRIDGE, subhead *Suspension Bridges*.

BROOKS, PHILLIPS (1835–1893), an American bishop of the Protestant Episcopal Church, one of the most eloquent pulpit orators of his day. He was born in Boston and educated at Harvard and at a theological seminary in Alexandria, Va. After his ordination as a clergyman Brooks was the rector of the Church of the Advent and later of the Holy Trinity Church, in Philadelphia. In 1869 he became rector of Trinity Church, Boston, remaining there for twenty-two years. In 1891 he was elected bishop of Massachusetts. Brooks was celebrated not

only as a popular and powerful preacher, but as a vigorous and independent thinker. He was well and favorably known in England, and on July 4, 1880, he delivered a sermon in Westminster Abbey. A week later, at Her Majesty's request, he preached before Queen Victoria in the Royal Chapel at Windsor, the first American clergyman to be thus honored. Among his publications are *Lectures on Preaching*, *The Influence of Jesus* and several volumes of sermons. He also is the author of his best-loved literary composition, the Christmas hymn *Oh Little Town of Bethlehem*.

BROOKS, PRESTON SMITH (1819–1857), an American politician. He became a member of Congress from South Carolina in 1853 and attained an unenviable notoriety in May, 1856, by making a brutal assault upon Charles Sumner in the United States Senate chamber. Brooks resigned his seat, but was immediately reelected by his constituents.

BROOM CORN, or **BROOM GRASS**, a useful and interesting member of the grass family, so called because it is utilized in making brooms. Though native to the East Indies, it is extensively cultivated in the United States, where the annual yield is nearly 80,000,000 pounds. Oklahoma, Illinois and Kansas produce the largest crops. The standard variety of the plant, which reaches a height of from eight to ten feet or more, bears a pithy stalk and produces long, pointed leaves resembling those of the corn plant. At the top of the stem appears the branching cluster of seed heads. These are harvested before they are ripe, being cut off with six inches of the stalk. After the seed is removed the brush is dried in the shade, and is then sent to factories in bales of about 300 pounds weight. One acre of ground will produce about 500 pounds of brush.

BROTHER JONATHAN, a name sometimes used to personify the people of the United States. It is said to have originated during the Revolution in a frequent remark of General Washington concerning Jonathan Trumbull, governor of Connecticut. Trumbull's advice and good judgment were highly valued by Washington, and at critical points the latter was wont to say, "we must ask Brother Jonathan." As the remark passed into current speech the term became broadened in meaning until it included all the people. It differs from *Uncle Sam* in that the latter typifies the government.

BROWN, a color which may be regarded as a mixture of red and black, or of red, black and yellow. There are various brown pigments, mostly of mineral origin, as bistre, umber and cappagh brown.

BROWN, CHARLES BROCKDEN (1771-1810), the first American novelist of any importance. He was educated for the law, but the term intended for preparatory legal study was principally occupied with literary pursuits. His first novel, *Wieland*, was published in 1798. Others of his works are *Mervyn*, *Ormund* and *Clara Howard*. Brown's novels, while in certain respects powerful, are of the highly sentimental, improbable type, and their tendency toward the gloomy and horrible has always kept them from becoming popular.

BROWN, ELMER ELLSWORTH (1861-1934), an American educator, who for five years held the position of United States Commissioner of Education. He was born in Kiantone, N. Y., and was educated in the Illinois State Normal University, University of Michigan and German universities. After filling several public school positions, Mr. Brown was chosen assistant professor of the science and art of teaching in the University of Michigan in 1891. From there he went to the University of California as associate professor of pedagogy, and in 1893 he was appointed head of the department. In June, 1906, he succeeded William T. Harris as Commissioner of Education for the United States. From 1911 to 1932 he was Chancellor of New York University. He was the author of several books on educational topics, and was a frequent contributor to magazines and reviews.

BROWN, GEORGE (1818-1880), a Canadian statesman, born at Edinburgh, Scotland, and educated at Edinburgh High School and at the Southern Academy. He went to New York in 1838 and to Toronto in 1843, where he founded *The Globe*, soon to become one of the leading Canadian papers. In the Canadian legislative assembly to which he was elected in 1851, he became the



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leader of the radicals. On July 31, 1858, after the defeat of Sir John A. Macdonald, he and Hon. A. A. Dorion formed a ministry but held office for only four days, resigning because the governor-general refused to dissolve Parliament. Brown took a leading part in the effort to secure Confederation, was a member of the Charlottetown and Quebec conferences and president of the Council in the coalition ministry of Sir Etienne Taché. In December, 1873, he was called to the Senate. He declined the lieutenant-governorship of Ontario in 1875 and the decoration of K.C.M.G. in 1879.

BROWN, JOHN (1810-1882), a Scottish physician and writer, best remembered as the author of a charming story called *Rab and His Friends*, in which the hero is a dog. Brown was educated at the University of Edinburgh. He practiced medicine in Edinburgh and wrote during his leisure hours many essays on medicine, literature and miscellaneous topics. These have been collected in a volume known as *Horae Subsecivae*.

BROWN, JOHN (1800-1859), an American abolitionist, celebrated as the originator of the Harper's Ferry insurrection. He was born in Torrington, Conn. His early years were spent in travels, apparently aimless and valueless, though at times he displayed in his business affairs the real force of his character. He lived at different times in Connecticut, Ohio and New York, was twice married and was the father of twenty children.

In 1855, with four sons, he migrated to Kansas and at once took a prominent position as an anti-slavery man. He became renowned in the fierce border warfare which was carried on for some years in Kansas and Missouri, and he gained particular celebrity by his victories at Potawatomie and Osawatomie.

About this time he seems to have formed the idea of effecting slave liberation by arming the slaves and inciting them to rise in



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revolt against their oppressors. As the first step in this scheme, he designed to seize the arsenal of Harper's Ferry, where an immense stock of arms was kept. On the night of October 10, 1859, he, with a handful of well-armed and resolute companions, including several of his sons, overpowered the small guard and gained possession of the arsenal. During the next morning he made prisoners of some of the chief men of the town, but there was no rising of slaves as he had expected. A squad of United States soldiers under Capt. Robert E. Lee regained control of the arsenal after a short but stubborn fight, in which Brown was severely wounded. On October 27, he was tried at Charlestown for treason and murder, was found guilty and was hanged December 2. His offense was generally condoned in the North, and his execution was condemned. This led the Southerners to become more bitter in their feeling against the antislavery party. The story of John Brown's raid has been kept alive through a song that is still popular—*John Brown's body lies a-mouldering in the grave.*

BROWN, JOHN GEORGE (1831-1913), an American painter, born in Durham, England. He studied in Newcastle-on-Tyne and in Edinburgh and in 1853 came to America. He was one of the original members of the Water Color Society and was its president in 1901. Brown is remembered especially for his portrayals of New York bootblacks and street urchins. Among his productions are *Hiding in the Old Oak*, *Pull for the Shore* and *Street Boys at Play*.

BROWNE, CHARLES FARRAR (1834-1867), an American humorist, best known as "Artemus Ward." Originally a printer, he became editor of papers in Ohio, where his humorous letters became very popular. He subsequently lectured in California and Utah and in England, where he also contributed to *Punch*. His writings consist of letters and papers by Artemus Ward, a pretended exhibitor of wax figures and wild beasts, and are full of drollery and eccentricity.

BROWNIE, in the superstitious lore of Scotland, an imaginary spirit formerly believed to haunt houses, particularly farm-houses. He was believed to be very useful to the family, particularly to the servants, for whom he was wont to do many pieces of drudgery while they slept. The brownies bear a close resemblance to the Robin Good-

fellow of England and to the Kobold of Germany. The *Brownie Books* of Palmer Cox, an American artist, are excellent modern stories based on these interesting little creatures.

BROWNING, ELIZABETH BARRETT (1806-1861), the most famous woman poet England has ever produced. She grew up at Hope End, near Ledbury, Herefordshire, where her father possessed a large estate. She was always extremely delicate, as she had been injured by a fall from her pony when a girl, but her mind was sound and vigorous and was disciplined by a course of severe and exalted study. She early began to commit her thoughts to writing, and in 1826 she published anonymously a volume entitled *An Essay on Mind, with Other Poems*. In 1840



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she received a severe shock from the drowning of her brother, and for a time her life was despaired of. Several years were spent in the confinement of a sick-room, but she was far from idle during this time, and some of her best-known poems, among them *The Cry of the Children* and *Lady Geraldine's Courtship*, appeared in 1844.

This last poem contained a compliment to Robert Browning, who called to thank her. Their acquaintance grew into a mutual love, and in 1846 they were married, greatly against the wishes of her father. It proved an unusually happy union. From the time of their marriage until Mrs. Browning's death, the poets lived in Italy, and here Mrs. Browning's health improved. She died in the Casa Guidi, at Florence, a city very dear to her, as she had wished.

The Prometheus Bound (from the Greek of Aeschylus) and *Miscellaneous Poems* appeared in 1833; the *Seraphim and Other Poems* in 1838; *Casa Guidi Windows*, a poem on the struggles of the Italians for liberty in 1848-1849, was published in 1851, and the longest and most finished of all her works, *Aurora Leigh*, a narrative and didactic poem in nine books, was published six years later. Two posthumous volumes, *Last Poems* and *The Greek Christian Poets and the English Poets* (prose essays and transla-

tions), were edited by her husband. Her *Sonnets from the Portuguese*, written during her engagement to Browning and not shown even to him until after their marriage, bear comparison with the finest sonnets in the English language and perhaps surpass all other love sonnets. The title *From the Portuguese* was given them simply as a disguise. (See article below.)

BROWNING, ROBERT (1812-1889), one of the great poets of the Victorian era, the exponent of a sound, healthful optimism. Browning's poetry is famed for thought; he appeals to those who regard vigor and strength in poetry of greater worth than lyric beauty. At times, however, this poet wrote lines as musical as any that ever have been penned. Browning's education was received neither in a large school nor in a college, but from private tutors and from travel on the Continent. He wrote poetry while he was but a boy, and when the poems of Shelley and Keats came into his hands they confirmed him in his desire to be a poet, although they made him look with disfavor on his own early attempts. His first published works met with little general success, although they were praised by the critics.



ROBERT
BROWNING

In 1844 Browning became acquainted with Elizabeth Barrett, through calling on her to thank her for a compliment which she had paid him in one of her poems. The acquaintance grew into love, and they were married in 1846. Their life together was very beautiful, and her death in 1861 was a shock from which Browning never completely recovered. He removed from Italy, where all of his married life had been spent, to England, that he might educate his son; there he was very popular socially. He returned, however, to Italy later, where he died.

Browning was a most productive writer. From the time that his first poem, *Pauline*, appeared, in 1832, until his death he wrote rapidly, revising little. This unwillingness to revise, which amounted practically to an inability, prevented Browning from attaining the faultless form which distinguished Tennyson's works. One thinks in reading Browning, less of the form than of the substance, and he is considered preëminent as a

poet-thinker. The study of the human soul had for him the greatest fascination, and he was able to analyze it and to describe its experiences as perhaps no other English poet except Shakespeare has ever been able to do. His genius was distinctly dramatic, and had he lived in an age when the drama was the chief form of literary expression, he might have done his greatest work in that field. It is, however, in the dramatic monologue that he excelled. Such poems as *My Last Duchess*, *Andrea del Sarto* (see PAINTING for an extract from this poem), *The Bishop Orders His Tomb at Saint Praxed's Church*, *Fra Lippo Lippi*, *A Forgiveness*, are fine examples of his success. *The Ring and the Book*, considered by most critics Browning's masterpiece, is a long poem made up of a series of monologues. The story is told simply in the first book, and in each of the remaining ones the view of some one speaker or class is expressed, and Browning is thus enabled to give some of his most subtle pictures of character.

Besides the poems mentioned above, his best-known works are the dramas *Strafford*, *A Blot on the 'Scutcheon*, *Colombe's Birthday*, *In a Balcony*, *Pippa Passes*, *Paracelsus*, *Saul*, *Rabbi Ben Ezra* and the poems comprised in the collection known as *Men and Women*.

Browning's characteristic optimism is well expressed in the following lines, in which he describes himself as—

One who never doubted clouds would break
Never dreamed, though right were worsted,
Wrong would triumph;
Held, we fall to rise, are baffled to fight better,
Sleep to wake.

BROWNSVILLE, TEX., settled in 1848 and incorporated in 1853, is the county seat of Cameron County, the most southerly town in the state, on the Rio Grande River, about fifteen miles from the Gulf of Mexico and opposite Matamoras, Mexico. It is 372 miles southwest of Galveston; the railroads are the Missouri Pacific, Southern Pacific, Port Isabel and Rio Grande, and the National Lines of Mexico. There is an international airport, and a deep-water port. There is a Roman Catholic college, a junior college in the public school system, a convent and a cathedral, a custom house, hospital, a library and a country club. Great quantities of grapefruit, oranges, and cotton are raised. Population, 1930, 22,021.

BROWN-TAIL MOTH, a European moth very destructive to orchard, forest and shade trees, introduced into New England about 1890. The female deposits her eggs on the under side of a leaf during the first three weeks in July; they hatch fifteen or twenty days later. The young larvae begin feeding on the outer coat of the leaf and when full-grown, spin a cocoon of grayish silk. The caterpillars pupate within their cocoons at the tips of twigs the latter part of June, and the moths emerge about the middle of July. On mornings during the flying season hundreds of the moths can be seen collected on lamp poles. The wings are pure white, the name brown-tail being given the moth on account of a bunch of brown hair at the tip of the abdomen of the female. The wing expanse of the female is about one and one-half inches, the male being slightly smaller. The destructive work is done by the caterpillars, whose winter webs can be seen at the tips of twigs from October to April.

Webs should be removed and burned, as web destruction is by far the best means of exterminating the moth. Spraying with kerosene emulsion or strong soap suds destroys the caterpillars (see INSECTICIDES). See also, GYPSY MOTH.

BROWN THRASHER, often incorrectly called a brown thrush, a large, handsome, reddish-brown bird, common in the Eastern United States, where it is considered one of the finest native songsters, not much inferior to the mocking bird. It is a good mimic, and in the early morning or evening time it perches in the top of a tree and sings sometimes for an hour or more. It nests in shrubbery and brush piles, laying four or five bluish-white eggs, spotted with reddish-brown. The brown thrasher is an industrious enemy of harmful insects.

BROWN UNIVERSITY, an educational institution in Providence, R. I., established in 1764 by an act of the general assembly of the state, under the name of Rhode Island College. It is thus one of the oldest American institutions of higher education. The college was founded at the request of the Baptists, under whose auspices the institution has always continued, although it is nonsectarian in spirit. In 1804 the name was changed to Brown University, in honor of Mr. Nicholas Brown, who had bequeathed the institution a large sum of money. In 1891 a woman's college was established, now

known as the Woman's College in Brown University. The institution has about 160 professors and instructors, more than 2,200 students, and an endowment fund of over \$9,000,000. The library contains more than 330,000 books and pamphlets.

BRUCE, ROBERT (1274-1329), the most heroic of Scottish kings. In 1296, as Earl of Carrick, he swore fealty to Edward I, and in the following year he fought on the English side against Wallace. He then joined for a time the Scottish army, returned again to his allegiance to Edward, and in 1299 he was appointed one of the four regents of the kingdom. In the three final campaigns he managed to keep up friendly relations with Edward and resided for some time at his court. In 1306, in a violent quarrel with Comyn, a claimant to the Scottish throne, he stabbed his adversary. He then assembled his vassals and claimed the crown, which he received at Scone. After being twice defeated, he dismissed his troops, retired to the Irish coast and was supposed to be dead; but in the spring of 1307 he landed on the Carrick coast, defeated the Earl of Pembroke at Loudon Hill and in two years had wrested nearly all of Scotland from the English. He then advanced into England, laying waste the country; and in 1314 he defeated at Bannockburn (which see) the English forces advancing under Edward II to the relief of the garrison at Stirling.

In 1316 he went to Ireland to the aid of his brother Edward, and on his return in 1318, in retaliation for inroads made during his absence, took Berwick and harried Northumberland and Yorkshire. Hostilities continued until the defeat of Edward near Bannockburn in 1323, and though in that year a truce was concluded for thirteen years it was speedily broken. Not until 1328 was the treaty concluded by which the independence of Scotland was fully recognized. Bruce did not long survive the completion of his work, but died at Cardross Castle in 1329.

BRUGES, *broozh*, BELGIUM, an old walled city, capital of the province of West Flanders. Its name, which means *bridges*, refers to the numerous bridges that cross the many canals intersecting the city. Bruges lies fifty-five miles northwest of Brussels, on the railway to Ostend. It is noted for the architectural beauty of its buildings, which includes the Market Hall, with a tower 354 feet high.

in which is a fine set of chimes; the Hotel de Ville; the Bourse; the Palace of Justice, and the Church of Nôtre Dame, with its elevated spire and splendid tombs of Charles the Bold and Mary of Burgundy. The old canals are those to Sluis, Ghent and Ostend; a new one extends to Zeebrugge; all of these bring large vessels to Bruges.

Two chief industries characterize Bruges—the manufacture of laces, and the development of horticulture. The new canal to Zeebrugge opened new commercial avenues, and steamship connection with England at Hull has increased exports. The city was held by the Germans for nearly all of the World War. Population, 1934, 52,300.

BRUMMELL, GEORGE BRYAN (1778–1840), an English man of fashion, called **BEAU BRUMMELL** because of his fastidious taste in dress. He was educated at Eton and at Oxford, and at the age of sixteen he made the acquaintance of the Prince of Wales, afterward George IV, who made him a cornet in his own regiment of the Tenth Hussars and secured his rapid promotion. Inheriting a large fortune from his father, Brummell lived extravagantly for twenty-one years, but later fell into misfortune and died miserably in an asylum for the poor.

BRUNELLESCHI, *broo nel les'ke*, FILIPPO (1377–1446), an Italian architect, born in Florence. When at Rome with Donatello he conceived the idea of bringing architecture back from the Gothic style to the principles of Greece and Rome. In this he was successful, as his work opened the way for Bramante and others, and made him the real founder of Renaissance architecture. He himself, however, did not depart entirely from the medieval art, as was shown by his design for the façade of the Church of Santa Maria Novella. In 1417 he removed to Florence, where he lived the rest of his life. His great achievement was the dome of the Cathedral of Santa Maria at Florence, the possibility of erecting which was denied by other architects. It has remained, however, unsurpassed, for the dome of Saint Peter's, though excelling in height, is inferior to it in massiveness of effect. He also designed the Pitti Palace at Florence and the Pazzi Chapel at Santa Croce.

BRUNHILDE, *broon hîl'da*. See **NIBELUNGENLIED**; **SIGURD**.

BRUNN, *brün*, (now **BRNO**), formerly in Austria, but now in Czechoslovakia, is sit-

uated on the railway from Vienna to Prague, eighty-nine miles north of Vienna. The city has an attractive location at the junction of the rivers Schwarzawa and Zwittawa. It contains a cathedral and other handsome churches, several palaces, a barracks and a new theater. Brünn has extensive manufactures of woolens, which long gave the city the name of the *Austrian Leeds*. There are other manufactures of leather, machinery, chemicals and beer. It is the center of Moravian commerce, a great part of which is carried on by fairs. Brünn dates back to the ninth century, though the new town was not founded until 500 years later. In 1918 Moravia joined with Bohemia, Silesia and Slovakia to form the Czecho-Slovak Republic (which see). Brünn (in Czech, Brno) is next to Prague (Prah) in size and importance. Population, 1931, 263,650.

BRUNSWICK, *brunz'wik*, the largest of the five duchies of the former German Empire, and the one from which came the ducal family whose descendants now rule in Great Britain (see **BRUNSWICK, FAMILY OF**). Brunswick is situated in the north-central part of Germany, and is surrounded by the Prussian provinces of Hanover, Saxony and Westphalia. With an area of 1,418 square miles, it is 170 square miles larger than Rhode Island.

The northern portion is hilly, or undulating. The southeastern part contains a portion of the Harz mountain system and rises in some places to an altitude of more than 3,000 feet. Deposits of iron ore, lead, copper and brown coal are found, and mining is an industry of some importance. About one-half of the land is capable of tillage, and the leading crops are grain, potatoes, flax, sugar beets and fruit. The manufacturing industries include brewing, distilling and the manufacture of linens, woolens, leather, paper, tobacco, soap and beet sugar.

Brunswick formerly sent two members to the Bundesrat and three deputies to the Reichstag. It was locally governed by an hereditary ruler, and had its own constitution and legislative body. The last duke, Ernst Augustus, abdicated on November 12, 1918, during the revolution that overthrew the empire (see **GERMANY**). Population, 1933, 513,000.

BRUNSWICK, FAMILY OF, a distinguished family founded by Albert Azo II.

Marquis of Reggio and Modena, a descendant, by the female line, of Charlemagne. Albert's son Guelph, who was created Duke of Bavaria in 1071, married Judith of Flanders, a descendant of Alfred of England, and from them descended Henry the Lion, who succeeded in 1125 to the control of the duchy and by marriage acquired Brunswick and Saxony. Otho, the great-grandson of Henry, by a younger branch of his family, was the first who bore the title of Duke of Brunswick (1235). By the two sons of Ernst the Confessor, who became duke in 1532, the family was divided into the two branches of Brunswick-Wolfenbützel and Brunswick-Lüneburg (House of Hanover), from the latter of which comes the present royal family of Britain.

BRUNSWICK, GA., founded in 1760 and named for the Duke of Brunswick, is the county seat of Glynn County, and is ninety miles south of Savannah and eight miles from the ocean, on Oglethorpe Bay. The city has the Atlantic Coast Line, the Southern, and the Atlanta, Birmingham & Atlantic railroads. There are large packing and canning industries and manufactures of powder, creosote, rosin and turpentine, and there are ship-building yards. The Federal building was erected a third of a century ago; there is a city library and a hospital. The population, largely American, was 14,413 in 1920 and 14,022 in 1930.

BRUNSWICK, GERMANY, capital of the State of the same name, is situated on the Oder River, thirty-five miles southeast of Hanover, and is on the railway from Hanover to Berlin. The streets of the older part of the city are narrow and winding and have all the characteristics of the cities of the Middle Ages. The most important public buildings are the ducal palace; the Cathedral of Saint Blaise, erected in 1173; Saint Catherine's Church, 1172, and Saint Magnus's Church, 1031; the Gewandhaus, and the old Gothic Council House. The educational institutions include a polytechnic school, a gymnasium and the Collegium Carolinum, an institution in grade between the common school and the university. The city also has a city museum and a public library. The leading industries are manufactures of woolens, linen goods, jute, machinery and chemical products. The city owns its gas plant and waterworks, slaughter houses and markets; it also has an excellent

sewage system. It is an important railway center and carries on a good trade in home products, grains and manufactures. Population, 1933, 156,840.

BRUNSWICK BLACK, a varnish composed chiefly of lampblack and turpentine, and applied to cast-iron goods to give them a glossy black and enamel-like surface. Asphalt and oil of turpentine are also ingredients in some varieties.

BRUSA, or **BROUSSA**, *broo'sah*, in ancient times called PRUSA, is a Turkish city in Asia Minor, about twenty miles south of Mudania, its port on the Sea of Marmora. The city has a picturesque situation at the foot of the ridges of Olympus, and is traversed by several branches of a mountain stream. Many ancient mosques, some in ruins because of earthquakes, and an old castle in the center of the place give it an Oriental charm, while its well-stocked bazars and manufactories of carpets and silks testify to its industrial importance. In the vicinity there are a number of tombs of Turkish royalty, and a mile west of the city there are four sulphur springs, which are visited for their medicinal qualities. Brusa is connected with its port by railway. Population, estimated, 90,000.

BRUSH, an article made of bristles, fibers or wire, set in a back and used for smoothing, cleaning and other purposes. Brushes are of two classes, those having stiff fiber and those with flexible fiber. The stiff brushes are made of hog's bristles, whalebone, palm fibers and occasionally of wire. The flexible brushes are made of fine bristles and the hair from certain animals, such as the camel, badger, squirrel, sable and goat. These are chiefly used for painting, and the smallest kind are called *pencils*. Brushes having more than one tuft of fiber are made by fastening the tufts into holes in the back, by means of a wire. When the tufts have all been fastened, a piece of finished wood or other substance is glued upon the back, and then the tufts are cut the same length.

BRUSH, CHARLES FRANCIS (1849-1929), an American electrician, famed as the inventor of the Brush dynamo for arc lighting, and of an electric lamp, as well as of a large number of devices which have been of great use in the development of the electric light. He was born in Euclid, Ohio, and educated at the University of Michigan. Brush was a member of numerous learned societies and

was elected to the French Legion of Honor. See **ELECTRIC LIGHT**.

BRUSSELS, BELGIUM, the capital of the kingdom and of the province of Brabant, 70 miles southeast of Ostend which is on the North Sea and 27 miles south of Antwerp. Gallic and Roman inhabitants, when driven out by the Franks, fled to the marshes of the Senne; hence the name Brussels, "village of the marsh." Two hundred years ago it was famed as one of the most beautiful cities of Europe, and still retains its historic charm. The city consists of a lower town and an upper town. The older or lower part is surrounded with fine boulevards, on the site of its fortifications, and is devoted almost entirely to commerce and industry. The upper town, which is partly inside the boulevards and partly outside, is the finest part of the city, and contains the king's palace, the government offices and the finest streets and hotels. Among the important buildings is the Hôtel de Ville, a part of which dates from the fifteenth century. It is an imposing Gothic structure, with a spire 364 feet in height, the square in front of it being perhaps the most beautiful of all the public places of Brussels. The Cathedral of Saint Gudule, begun about 1220, the finest of many fine churches, richly adorned with sculptures and paintings; the royal palace; the Palace of the Nation, and the Palace of Justice are other notable structures.

The institutions comprise a university, an academy of science and the fine arts and polytechnic school; one of the finest observatories in Europe; a conservatory of music; a public library containing 400,000 volumes; a picture gallery, with the finest specimens of Flemish art, and many learned societies and educational organizations. The manufactures and trade are greatly promoted by canal communications with Charleroi, Meehlin, Antwerp and the ocean, and by the network of Belgian railways. The industries are varied and important. Lace, an ancient manufacture, is still of great importance, and the manufacture of cotton and woolen fabrics, paper, carriages and many minor products is carried on. There are breweries, distilleries, sugar refineries and foundries.

During the Middle Ages Brussels did not attain great importance. It was fortified with walls by Baldric of Louvain in 1044, and in 1430, when Brabant passed into the hands of the Dukes of Burgundy, was a pros-

perous city. It became the seat of government during the rule of the Hapsburgs, early in the sixteenth century. Bombarded and burned by the French in 1695, it was again taken by the French in 1794 and was retained till 1814. From 1815 to 1830 it was one of the capitals of the Kingdom of the Netherlands, and in 1830 it was the center of the revolt which separated Belgium from Holland. The commercial fair first held in 1920 has drawn exhibitors and visitors from many lands. The new university buildings were begun in 1924. Population, with suburbs, 1932, 887,623.

BRUSSELS SPROUTS, one of the cultivated varieties of cabbage. The plant has an elongated stem four or five feet high, and bears small, clustering green heads like miniature cabbages. The heads are gathered in the autumn and are cooked in about the same way as cauliflower. The plant had its origin in Belgium.

BRUTUS, DECIMUS JUNIUS (84-43 B. C.), a Roman soldier who served under Julius Caesar, in Gaul, was afterward commander of his fleet and was even chosen as Caesar's heir in the event of the death of Octavius. Despite this, however, he joined in the assassination of Caesar. He was afterward for a short time successful in opposing Antony, but he was deserted by his soldiers in Gaul and betrayed into the hands of his opponent, who put him to death.

BRUTUS, MARCUS JUNIUS (85-42 B. C.), a distinguished Roman, one of the leaders in the conspiracy to assassinate Caesar. He was at first an enemy of Pompey, but joined him on the outbreak of civil war and remained with him until the Battle of Pharsalia. He then surrendered to Caesar, who made him in the following year governor of Cisalpine Gaul, and afterward of Macedonia. He soon, however, joined the conspiracy against Caesar, and by his influence insured its success (see **CAESAR**, CAIUS JULIUS). After the assassination Brutus took refuge in the East, made himself master of Greece and Macedonia and with a powerful army joined Cassius in the subjugation of the Lycians and Rhodians. In the meantime the triumvirs, Octavianus, Antony and Lepidus, had been successful at Rome, and were prepared to encounter the army of the conspirators, which, crossing the Hellespont, assembled at Philippi in Macedonia. Cassius appears to have been

beaten at once by Antony; and Brutus, though temporarily successful against Octavianus, was totally defeated twenty days later. He escaped with a few friends; but, seeing that his cause was hopelessly ruined, he fell upon the sword held for him by his friend Strabo, and died. A sympathetic view of Brutus is given in Shakespeare's *Julius Caesar*, in which he is the real hero.

BRYAN, WILLIAM JENNINGS (1860-1925), an American lawyer, orator, journalist and politician, who became one of the most influential leaders of the Democratic party of his time. He was three times defeated for the Presidency, but he never lost the regard of a very large number of followers. Bryan was born in Salem, Ill. He attended the public schools in his native village and completed his education at Whipple Academy and at Illinois College, Jacksonville, Ill. He then entered the Union College of Law at Chicago, graduating in 1883, and began the practice of his profession at Jacksonville.



WILLIAM J. BRYAN

In the following year he was married to Miss Mary Baird, who, having also received a legal education, was thereafter his valued adviser in both business and politics. In 1887 he removed to Lincoln, Neb., where he continued to practice law and also entered politics, affiliating with the Democratic party. Bryan soon attracted public notice by his eloquent advocacy of free trade. By a vigorous personal canvass he was chosen to Congress from a Republican district by a huge majority, and for two terms was a conspicuous member of that body. During this service he heightened his reputation as a political orator by several notable speeches in favor of free trade. In 1893 he was Democratic candidate for the United States Senate, but was defeated. He then became editor of the *Omaha World-Herald*, but after a short time returned to his law practice.

Bryan had severely criticised the Cleveland administration for its attitude upon the money question, and at the Democratic national convention in Chicago in 1896, by a remarkable speech urging the adoption of the policy of free coinage of silver at

the ratio of sixteen to one, he captured the nomination for the Presidency. His candidacy was endorsed by the Populist and Silver Republican parties. Then followed one of the most noteworthy campaigns in American history, during which Bryan traveled more than 18,000 miles and made hundreds of addresses. He was defeated, however, by William McKinley, the Republican candidate. At the outbreak of the Spanish-American War he organized a volunteer regiment and became its colonel. In 1900 he was again nominated for President by the Democrats, but was again defeated by McKinley. After his second defeat he founded a weekly paper called *The Commoner*, later changed to a monthly. In 1906 he made a tour around the world, which he described in a series of letters to several American newspapers.

His Later Career. After the disastrous defeat of the Democrats in 1904, it was felt that the strongest candidate possible should be chosen to represent the party in 1908. Bryan had been little heard of in politics for the first two years after 1904, but as the next campaign approached he was looked upon as the only man who could defeat the Republicans. Thus for the third time he ran for the Presidential office, but was decisively defeated by William H. Taft. Even this defeat failed to shake his influence among the liberal Democrats, and in 1912 at the Baltimore convention he was the dominating personality. The nomination of Woodrow Wilson was without question due to his decisive stand for that distinguished candidate, a fact recognized by Wilson when he formed his cabinet, in which Bryan held the office of Secretary of State.

It must be acknowledged, however, that Bryan did not achieve pronounced success in this position. He held the office at a time when the government was forced to meet very complicated international questions growing out of the World War, and it soon became apparent that the decision on all important points was always left to the President. In June, 1915, he tendered his resignation because he disagreed with the President's handling of certain complications arising from the war, particularly those pertaining to Germany's submarine activities.

Though Bryan was an outspoken pacifist, he immediately gave his full support to the administration as soon as America entered

the war, and his striking talents as an orator were used generously in upholding the President. He was also especially interested in the Prohibition cause, for it had received his support for many years. In the summer of 1925 he acted as counsel for the State of Tennessee in the "evolution" case, at Dayton. From the strain and excitement of this struggle he died, July 26.

BRYANT, WILLIAM CULLEN (1794-1878), an American poet and journalist, the first great poet of the United States. Because of this fact he is often called the "father of American poets." Bryant was born at Cummington, Mass., November 3, 1794. When but ten years old he contributed his first poem to a country newspaper, and at fourteen he composed *The Embargo*, a satirical poem about the navigation act of that name. It was probably in his seventeenth year that Bryant wrote *Thanatopsis*, his most famous poem. Six years later, in 1817, Bryant's father accidentally discovered it among his son's papers, and was so impressed by its merit that he took it to Boston and showed it to the editor of the *North American Review* and other literary men. Their amazement on learning that it had been written by a youth of seventeen is understandable; for maturity of thought and nobility of language, nothing like it had thus far been produced in America. These qualities are shown in the following lines:

* * * Take the wings
Of morning, pierce the Barcan wilderness,
Or lose thyself in the continuous woods
Where rolls the Oregon, and hears no sound
Save his own dashings—yet the dead are there:
And millions in these solitudes, since first
The flight of years began, have laid them down
In their last sleep—the dead reign there alone.
So shalt thou rest, and what if thou withdraw
In silence from the living, and no friend
Take note of thy departure? All that breathe
Will share thy destiny. * * *

The editor of the *Review* not only published the poem, but invited its author to become a regular contributor.

By the time he was twenty-one, Bryant had also written *To a Yellow Violet*, *Inscription for the Entrance to a Wood*, *To a Water-fowl* and other poems of less merit. He became a frequent contributor to the *North American Review*, most of his articles consisting of literary criticism. In 1821 he was invited to deliver a poem before the Phi Beta Kappa society of Harvard, and for the

occasion he wrote *The Ages*, which, with several other poems, was published in 1825. In the same year he removed to New York and became associate editor of the *New York Evening Post*, of which, three years later, he became editor in chief. Under him, the *Post* became a strong anti-slavery, Democratic supporter of the Union. He retained this position until his death.

Bryant's place in American literature is unique; his career as author and journalist covered two-thirds of a century and he was the leading American writer of verse until the rise of Longfellow. During the long period of his active life he retained to their fullest capacity his superb intellectual powers. He never ceased to be progressive and productive. Stoddard says of him: "He enjoyed the dangerous distinction of proving himself a great poet at an early age; he preserved this distinction to the last for the sixty-four years which elapsed between the writing of *Thanatopsis* and the *Flood of Years* witnessed no decay in his poetic capacities, but rather the growth and development of trains of thought and forms of verse of which there was no evidence in his early writings."

Bryant was the poet of nature, but few of his poems are without the note of moralizing. Nearly all are short, and many of them are so well known as to be almost household words. Besides those already mentioned, may be cited *To the Fringed Gentian*, *The Death of the Flowers*, *The Crowded Street*, *My Country's Call* and *The Battlefield*, as among his popular poems. He also translated the *Iliad* and the *Odyssey* and published *Letters of a Traveler*; *Letters from the East*; *Letters from Spain and Other Countries*, and *Orations and Addresses*.

Other interesting facts about Bryant may be found in the article Reading.

BRYCE, GEORGE, REV. (1844-1931), a Canadian clergyman and author, born at Brantford, Ontario; educated at Brantford High School, University of Toronto and Knox College, Toronto. Dr. Bryce played an important part in the development of Manitoba; he was selected by the General Assembly of the Presbyterian Church to organize a church and college at Winnipeg in 1871. He was one of the founders, councillor and examiner of the University of Manitoba; he was also head of the faculty of science and lecturer in biology and geology. He was



JOHN BUCHAN, FIRST BARON TWEEDSMUIR
Governor-General of Canada

senior professor and financial agent of Manitoba College, also professor of English. He is the author of many articles and books on Canadian history; among the best known are *Manitoba: Infancy, Progress and Present Condition*; *Short History of the Canadian People*, and *Remarkable History of the Hudson's Bay Company*.

BRYCE, *brise*, JAMES VISCOUNT (1838-1922), an eminent British historian, diplomat and legislator, who has done much to create a friendly understanding between his own country and the United States. He is known especially as the author of *The American Commonwealth*, the best interpretation of American political institutions ever written. Bryce was born at Belfast and educated at the University of Glasgow and at Oxford. At the age of twenty-six he published *The Holy Roman Empire*, a book that gave him international fame as an historian.

He was admitted to the bar in 1867 and three years later he was made regius professor of civil law at Oxford, a position he held for twenty-three years. From 1885 to 1906 he was a member of Parliament. While serving in Parliament he was an inspiring leader in the cause of national education in England, and was chairman of the Royal Commission on Secondary Education in 1894. From the first he was a Liberal in politics and a strong advocate of Home Rule for Ireland, and was chief secretary for Ireland in 1905. From 1906 to 1913 Bryce served as ambassador of Great Britain to the United States with high distinction, and in 1914 he was raised to the peerage. In 1915 he headed a commission of jurists who investigated German atrocities. In 1921 he published *Modern Democracies*.

BRYN MAWR, *mar*, **COLLEGE**, an institution for the higher education of women, located at Bryn Mawr, Pa., and founded in 1880 by Joseph W. Taylor, who was a member of the Society of Friends. The college is characterized by its high requirements for admission and the general culture and high scholarship of its students. It maintains a faculty of ninety members and has about 800 students. The library contains 100,000 volumes.

BRYOPHYTES, *brí'ó fítes*, members of one of the four orders into which the non-flowering plants are divided. The two great classes of bryophytes are the liverworts and mosses. None of the plants has true roots,

but all develop other organs which perform the same work as roots. Some have leaves, but not a few are leafless. See MOSSES; BOTANY.

BUBONIC PLAGUE. See PLAGUE.

BUCCANEERS, *buk a neers'* the name given to a class of adventurers who in the sixteenth and seventeenth centuries infested the Caribbean Sea and neighboring coasts and preyed upon commerce. Famous among them were the Elizabethan seamen, including Drake and Hawkins, who operated against Spain with the consent and assistance of the British government, on account of the religious wars between the two countries. In the eighteenth century, as the codes of international law became more settled and embodied more advanced ideas, buccaneers or freebooters were compelled to adopt the methods of pirates, or outlaws, among whom Captain Kidd was perhaps the most famous. The next development was the practice of marooning, that is, putting those whom they had robbed ashore on desert islands. By the end of the eighteenth century, all of these practices had practically been abandoned.

The name *buccaneer* has an interesting origin. It is derived from the French *boucan*, which means *place for curing meat*, and was applied because the first buccaneers stole cattle and sold to seamen the meat which they cured. In course of time they stole the vessels of the seamen and took to the sea themselves.

BUCEPHALUS, *busef'a lus*, the favorite horse of Alexander the Great, which, according to legend, Alexander himself broke in. The horse died during Alexander's expedition to India, and Alexander built near its grave a city called Bucephalia.

BUCHAN, JOHN, First Baron Tweedsmuir since 1935 (1875-), the first commoner ever appointed to the governor-generalship of Canada, was born in Scotland and educated at Glasgow and Oxford. During the World War he was director of information for the British Cabinet, following a period as secretary in the Union of South Africa. In 1927 he entered Parliament as representative of the Scottish Universities, where he remained until he received the Canadian appointment. Before assuming his new post, he was created a baron. Buchan achieved a high reputation in the literary field, and has more than twenty books to his credit; they range from fiction to historical subjects.

Universitäts- bibliothek Bonn



MINNESOTA BECOMES A
STATE - 1858 -



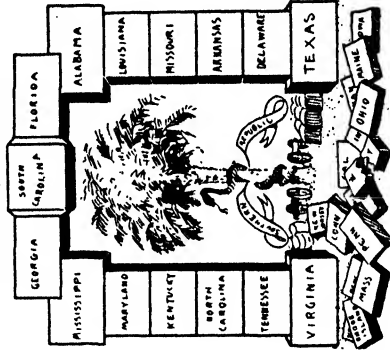
OREGON ADMITTED TO
THE UNION - 1859-



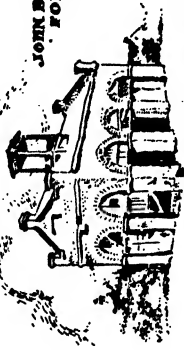
KANSAS ADMITTED AS A
STATE-1860-



CONFEDERATE STATES
ORGANIZED IN 1861-

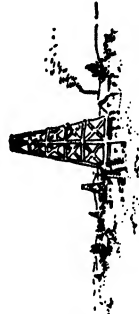


**JOHN BROWN'S
FORT.**



JOHN BROWN'S RAID AT HARPER'S FERRY.
1859

**• OIL DISCOVERED IN PENNSYLVANIA •
• 1859 •**



OTHER IMPORTANT EVENTS

FINANCIAL PANIC - 1857
LANK OF THE ATLANTIC CABLE - 1857
LINCOLN - DOUGLAS DEBATES 1858
COMSTOCK LODGE DISCOVERED - 1858
MORMONS AT UTAH OVERPOWERED - 1858
8TH CENSUS POP: 31,443,321 - 1860
• SECESSION OF SOUTH CAROLINA - 1860 •

•DREW SCOTT DECISION• 1857





BUCHANAN, *bu kan'an*, JAMES (1791-1868), fifteenth president of the United States, remembered as one who tried to carry out a policy of compromise at a time when decisive measures were necessary. It is generally conceded that Buchanan was sincere, but that he failed to measure up to the difficult position which confronted him just before the outbreak of the Civil War.

He was born close to Mercersburg, Pa., of Scotch-Irish parents, and was educated at Dickinson College, Carlisle, Pa. After completing a course in law he was admitted to the bar in 1812 and soon obtained a large practice. After an interval of service as a private in the War of 1812, Buchanan entered politics. Originally a moderate Federalist, he became a Democrat when his party ceased to exist, and remained a Democrat for the rest of his life. He was elected to the Pennsylvania legislature in 1814, and from 1821 to 1831 represented his district in the House of Representatives. On retiring from Congress he was appointed United States minister to Russia. During the two years he remained in Russia, Buchanan negotiated a mutual trade agreement between the two countries that remained in force until 1912. In 1834 he was elected to the United States Senate and remained in that body until 1845. A loyal supporter of Andrew Jackson, he vigorously defended the President's right to remove officers without the consent of the Senate (see JACKSON, ANDREW).

During Van Buren's administration Buchanan gave his support to the establishment of an independent treasury; under Tyler he sustained the veto power, opposed the ratification of the Webster-Ashburton Treaty and was one of the earliest advocates of the annexation of Texas. In 1845 he left the Senate and became Secretary of State in Polk's cabinet. While occupying this position he was largely instrumental in settling the northwestern boundary between the United States and British provinces. On the election of Pierce, Buchanan was appointed minister to Great Britain. He was a proslavery man and signed the Ostend Manifesto

(see OSTEND MANIFESTO). In 1856 he secured the Democratic nomination for the Presidency, and at the election he received 174 electoral votes, being elected over Fremont, the Republican and Fillmore the candidate of the Know-Nothing party.

Buchanan began his term as President high in the confidence and esteem of his party. His career as statesman and diplomat had been an honorable one, and much was expected of him. As President, however, he was unfortunate both in his foreign and in his domestic policies. He eagerly favored the annexation of Cuba, and apparently had hopes of seeing parts of Central America brought into the Union, as he gave encouragement to William Walker, who tried to become dictator of Nicaragua. These policies alienated the antislavery classes and were even disapproved by the Democratic Senators. As time passed by and the North and South drifted farther apart, Buchanan took no steps to avert the threatened breaking up of the Union. He endeavored to maintain an impartial attitude, though he was considered a proslavery man, and when South Carolina and the other Southern states seceded he took the extraordinary position that while the states had no right to secede, the United States had no right to force them to remain in the Union. His lack of decision in protecting Federal property in the South was bitterly resented, and the whole country was relieved when his term of office ended. Retiring to his estate near Lancaster, Pa., he sought seclusion and died there three years after the close of the war.

It is an interesting fact that the question of Buchanan's loyalty was the subject of a debate in the United States Senate in the spring of 1918. The debate came about through the proposal to erect a statue in his honor in Washington; the decision was favorable to him, and the measure was favorably reported.

BUCHANAN, ROBERT WILLIAMS, (1841-1901), an English poet, critic and novelist, educated at the University of Glasgow. He was for many years a writer for the *Contemporary Review*, published several novels and some good poetry, and wrote the plays of *A Man's Shadow* and *Dick Sheridan*. His criticisms, under the title of *The Fleshly School of Poetry* and *The Voice of the Hooligan*, on Rossetti and Kipling, respectively, stirred up much discussion.

Administration of James Buchanan

I. THE PRESIDENT

- (1) Birth
- (2) Parentage
- (3) Education
- (4) Public career
- (5) Character
- (6) Death

II. DRED SCOTT DECISION

- (1) Questions at issue
 - (a) Jurisdiction of the courts
 - (b) Constitutionality of the Missouri Compromise
 - (c) Effect of residence in free state
- (2) Decision of the court
 - (a) No jurisdiction
 - (b) Missouri Compromise unconstitutional
 - (c) Negro not a citizen
- (3) Effect of the decision
- (4) The verdict of history

III. THE CRISIS

- (1) The Kansas question
 - (a) Struggle for admission
 - (1) Congress votes for admission under the Lecompton Constitution
 - (2) Kansas rejects the Lecompton Constitution
 - (3) Admitted as a free state
 - (b) Breach in the democratic party
 - (1) Northern antislavery
 - (2) Southern proslavery
- (2) Popular education on slavery
 - (a) By speeches
 - (1) Lincoln-Douglas debates
 - (a) Douglas elected Senator
 - (b) By writings
- (3) Personal liberty laws
 - (a) Conflicting with the Fugitive Slave Law
 - (b) Aroused popular opinion
 - (1) Growth of the underground railroad
 - (2) Anger of the South

(4) John Brown's raid

- (a) The man
- (b) The project
 - (1) To call out slaves in revolt
 - (2) To use force
 - (3) Aid from friends in the North

(c) The attack

- (1) Preparations
- (2) Seizure of the arsenal at Harper's Ferry
- (3) Failure

(d) Results of raid

- (1) Execution of Brown
- (2) Roused public opinion

(5) The election of 1860

- (a) The Democratic party
 - (1) Charleston Convention
 - (2) Baltimore Convention
- (b) The Republican party
- (c) Result of the election

(6) Secession

- (a) South Carolina
 - (1) Ordinance of Secession
 - (2) Siege of Fort Sumter
- (b) Efforts at compromise
 - (1) Crittenden proposal
 - (2) Peace Conference
- (c) Formation of Confederacy
 - (1) Seven states
 - (2) Constitution
 - (3) Election of Jefferson Davis

Questions on Buchanan

Give a short sketch of the public career of James Buchanan.

What were the questions at issue in the Dred Scott case? How were they decided? What were the Lincoln-Douglas debates? Why were they important?

Give a brief account of John Brown's attack on Harper's Ferry.

Who were the three leading Presidential candidates in the field in 1860?

State, as briefly as possible, Lincoln's views on the questions at issue.

What states formed the newly formed Confederacy?

BUCHAREST, or **BUKHAREST**, *boo ka-rest'*, RUMANIA, the capital city of the kingdom, situated in a fertile plain and on the Dimbovitza River, about thirty-three miles north of the Danube. For more than 200 years it has been the center of gayety and fashion, and has earned the name of "Little Paris." Among the chief buildings are the royal palace, the national theater, the university buildings, the national bank, the mint and the archiepiscopal church. There are also handsome public gardens. The manufactures are varied, but unimportant; the trade is considerable, the chief articles being grain, wool, honey, wax, wine and hides.

The mercantile portion of the community is mostly foreign; before the World War business was largely in the hands of Germans; Rumania joined the Allies in the war, and afterward Jews came largely into control of the city's commercial interests. The whole population is represented by many nationalities; besides Rumanians, there are Jews, Greeks, Russians, Poles, Turks, Hungarians, and Germans who have returned. Population, 1930, 631,288; in 1935, estimated, 650,000.

BUCK, **DUDLEY** (1839-1909), an American musician, known especially as a composer of church music. He was born at Hartford, Conn., studied in Leipzig, Dresden and Paris, and lived in Chicago for several years. Then he became organist of Boston Music Hall and afterwards of Holy Trinity Church, Brooklyn, where he remained for twenty-two years. He wrote a cantata which was performed under the direction of Theodore Thomas at the inauguration of the Centennial Exhibition of 1876, and he also composed many pieces for the organ and numerous anthems. Of special merit are his *Golden Legend*, a cantata based on Longfellow's poem; the *Festival Te Deum* and the overture to *Marmion*.

BUCK BEAN, **BOG BEAN**, or **MARSH TREFOIL**, a beautiful plant, common in spongy, boggy soils, and found in Britain, throughout Europe, in Siberia and in North America. It is from six to twelve inches in height, and it flowers in early summer. The beautiful clustered flowers are waxy white and are covered on the inner surface with a coating of dense fleshy hairs. The whole plant, the root especially, has an intensely bitter taste.

BUCKETSHOP, a business place having the outward form, but not the true purpose, of a legitimate stock- or grain-brokerage office. A pretense is made of buying and selling securities or commodities on margin, but there is no actual purchase of stocks or provisions, for the bucketshop owners possess none and do not expect to buy any. Theoretically, the bucketshop operates as follows:

Customers who enter into contracts for buying or selling are merely credited with the money they advance on margins. If the securities or commodities a person "buys" advance in price, he is supposed to receive as profit the difference between the market price at the time of "purchase" and the advance price. If the price falls beyond the limit covered by his margin and he does not put up further protecting margins, he loses his investment, which goes to the management as profit. Margins are usually very small, but the probability of a customer's receiving any profit is very slight. The purpose of the bucketshop owner is to defraud, and he can always close the office and disappear over night if it appears that his customers are entitled to profits instead of himself.

At least three-fourths of the states have passed laws dealing with bucketshop operators, who are usually regarded as gamblers. In some states it is a felony for a person to enter a bucketshop for the purpose of making contracts with the owner. The laws either forbid the operation of bucketshops specifically, or provide penalties of fine and imprisonment for the carrying on of transactions where there is no expectation of fulfillment. Because of the stringent laws, and the refusal of legitimate exchanges to release quotations, the old-fashioned bucketshop as such is rarely seen, but there are unscrupulous brokers who trade against their customers' positions in a manner difficult to detect, and who in reality are "bucketers." The Securities Exchange Act of 1934 and the Commodity Exchange Act of 1936 place all brokers under Federal supervision.

BUCK'EYE, an American name for certain species of horse-chestnuts. Ohio is called the Buckeye State. See **HORSE-CHESTNUT**.

BUCK'INGHAM, **GEORGE VILLIERS**, Duke of (1592-1628), a favorite of James I and Charles I of England. In 1623, when the Earl of Bristol was negotiating a marriage

for Prince Charles with the infanta of Spain, Buckingham went with the prince to Madrid to carry on the suit in person. The result, however, was the breaking off of the marriage and the declaration of war against Spain. After the death of James, Buckingham was sent to France, as proxy for Charles I, to marry Henrietta Maria.

In 1626, after the failure of the Cadiz expedition, he was impeached, but was saved by the favor of the king. Despite the difficulty in obtaining supplies, Buckingham took upon himself the conduct of a war with France, but his expedition in aid of Rochelle proved an entire failure. In the meantime the spirit of revolt was becoming more formidable; the Petition of Right was carried despite the duke's exertions, and he was again protected from impeachment only by the king's prorogation of Parliament (see PETITION OF RIGHT). He then set out on another expedition to Rochelle, but was assassinated while embarking.

BUCKLE, HENRY THOMAS (1821-1862), an English historical writer who devoted the best years of his life to the writing of a *History of Civilization*. Though he labored for seventeen years on this work, when he died only two introductory volumes were completed. The work was characterized by much novel and suggestive thought and by the use of a vast store of materials drawn from the most varied sources, and has been helpful in arousing interest in historical research.

BUCKNER, SIMON BOLIVAR (1823-1914), an American soldier and politician, born in Kentucky. He was educated at West Point and served with distinction in the Mexican War. At the outbreak of the Civil War he joined the Confederate army and performed good service throughout the war, especially in the defense of Fort Donelson, at Murfreesboro and at Chickamauga. On May 26, 1865, he surrendered the last army corps of the Confederates to General Canby, of the Federal army. In 1896 Buckner was a candidate for the vice-presidency on the National (Gold) Democratic ticket, with Senator Palmer of Illinois.

BUCKSKIN, a soft leather made from the skin of deer, and used as a material for gloves. The leather acquires its characteristic softness from oil used in the dressing. Buckskin may be either gray or yellowish. It was formerly employed as a garment ma-

terial by the Indians and plainsmen, and the term is a common one in stories of the West. At the present time the name is applied to a twilled woolen fabric from which riding breeches are made.

BUCKTHORN, an important group of trees and shrubs, several species of which belong to North America. The common buckthorn, a British and North American shrub, grows to seven or eight feet in height, has strong spines on its branches, elliptical and serrated leaves, male and female flowers on different plants, a greenish-yellow calyx, no corolla and a round, black berry. The juice of the ripe berries, mixed with alum, forms an olive-green coloring matter used by artists, and the berries also have laxative properties. One species in the Pacific states yields the Cascara bark which is used medicinally.

BUCKWHEAT, a plant producing a three-sided seed and usually styled a grain. It is, however, very different from the grains; it belongs to the same family as the pieplant.

The origin of buckwheat is not known, but it is supposed to be a native of Asia and was therefore named *Saracen wheat* by the French.

The plant has smooth, branching stems, green leaves with dark veins, and white flowers. It takes its name from a German word meaning *beech wheat*, because of the resemblance of the seeds to the beech nut. Buckwheat grows in poor soil and is extensively cultivated in China and other Eastern



BUCKWHEAT

countries as a food plant. In Europe the seed is used principally as feed for stock and poultry, but in the United States and

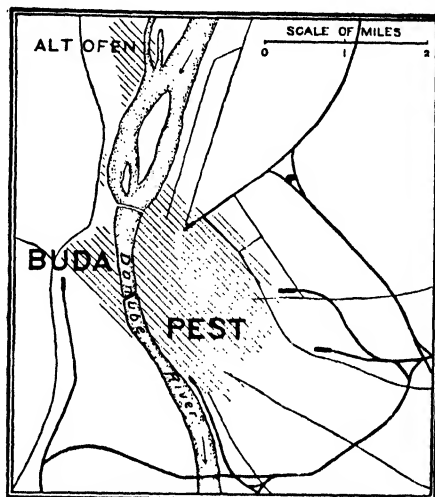
Canada it is quite extensively used to make flour from which breakfast cakes are prepared. The plant has other uses. Its flowers are visited by bees, for the nectar makes an excellent dark-colored honey. Buckwheat is sometimes used in brewing and in the preparation of cordials, and the blossoms are the source of a brown dye.

Buckwheat has for many years been a secondary crop in America, but its short growing season, its ability to thrive on comparatively poor soil, and the fact that this hardy grain can be grown quite far north has had the effect of stimulating production. In average years in the United States Pennsylvania leads in production, and New York is a close second. More than half of the nation's crop comes from these states. Minnesota is third in bushels produced, and Michigan is usually fourth. Canada's crop is about half that of the United States. The legal weight varies in the American states and Canadian provinces from 48 to 52 pounds per bushel.

BUD, an undeveloped stem, leaf or flower. The purpose of the leaf bud is to carry the living parts of the leaf safely through winter or an unfavorable season. By opening a large leaf bud, such as one may find on a hickory tree, it is possible to see the regular transition from the perfect leaves within, to the very simple, hairy scales that act as protective organs on the outside. The leaflets are packed away in perfect and regular order, always the same in any one kind of plants. For instance, the two halves of the cherry leaf are folded together with the under surfaces outward; in the common wood sorrel, each leaflet is folded smoothly, and then the three are packed away closely side by side. Special means of protection for the delicate inner parts are provided by nature in the way of waterproof varnish, warm woolly coats and thick, strong husks.

BUDAPEST, *boo'da pest*, HUNGARY, the capital and largest city of the new republic. Next to Vienna it was the largest city in the old Austro-Hungarian monarchy. It is made up of two cities on the Danube River, Buda on the west bank and Pest on the east bank, the two being united as one city in 1872. Buda, the smaller and more ancient of the two, is situated on and about a hill, which is crowned with a citadel and the royal palace. The city is noted for its bitter-water springs, such as the Hunyadi Janos

and others. Pest lies in a sandy plain and has an extensive frontage on the Danube. It has many beautiful buildings, among which are the new houses of Parliament, an academy of science, a national picture gallery, a national museum, a university and the royal opera house. The city is well endowed with educational and scientific institutions. Budapest is known also for its



beautiful streets, the finest of which is Andrássy Strasse, one of the handsomest boulevards in Europe.

In Central Europe this city ranks next to Vienna in commerce; it is one of the world's largest flour-milling centers. Other manufactures are machinery, cutlery, glass, metal and leather articles.

The history of Buda dates back to about A. D. 150, when the city was the site of a Roman camp. In the sixteenth and seventeenth centuries it belonged to the Turks, and it stood many sieges in this time. In 1848, under the Hapsburgs, it was taken by the Hungarians, after a heroic defense by Hentzi. Pest is of later origin, having been first a town inhabited by Germans in the thirteenth century. In the middle of the nineteenth century it became the capital of the Hungarian kingdom, and in 1873 it was united with Buda as Budapest. In 1918 the city was the scene of many disturbances due to political discontent and food shortage growing out of the World War, and with the dissolution of the Austro-Hungarian monarchy it became the capital

of the Hungarian Republic, proclaimed on November 16, 1918 (see HUNGARY; WORLD WAR). Population, 1934, 1,027,100.

BUDDHA, *bood'ah*, (the Wise or the Enlightened), the sacred name of the founder of Buddhism, a sage who is supposed to have lived in India in the sixth century B. C. His personal name was Siddhartha; his family name, Gautama. His father was a petty king of the warrior caste, who ruled over Kapilavastu, a small community north of Benares on the southern border of modern Nepal. His mother died when he was a child, and his education was directed by his father. Undoubtedly, like other well-born youths, he devoted himself to the study of the Vedas. Siddhartha was born at a time when India was seething with revolt against the sterility and formalism into which Brahmanism had degenerated. It was an age of religious thought; the founder of Buddhism was born in the same century as Pythagoras, the Greek philosopher, and Confucius, the sage of China. The time was ripe for the coming of a wise teacher who would revitalize the ancient religion of the Hindus, and such a leader was Buddha, the Enlightened.

Of his youth little is known except what we learn from legendary tales, such as have been used by Edwin Arnold in his *Light of Asia*. Buddha's father, noticing his habit of religious dreaming and his desire for solitude, built for him a palace and surrounded him with every luxury that would induce him to remain at home. But fearing age, disease and death, the son left his father's court and studied with the Brahmins. He then went into solitude under a bo tree and resolved to remain till he had gained a knowledge of the past, the present and the origin of evil. There he fasted and meditated until he received the enlightenment.

After a long period of meditation, fasting and self-torture, he came to the conclusion that this life is one link in a chain of transmigration, and that only extinction of all desire will deliver from suffering. Commencing at Benares, he began to teach his new faith, in opposition to the prevailing Brahmanism. Among his earliest converts were the monarchs of Magadha and Kosala, in whose kingdoms he passed most of the latter portion of his life, respected, honored and protected. See **BUDDHISM**.

BUDDHISM, *bood'iz'm* the religious system founded by Buddha, one of the most

prominent doctrines of which is that *Nirvana*, or an absolute release from existence, is the chief good. According to Buddhism pain is inseparable from existence, and consequently pain can cease only through Nirvana; and in order to attain Nirvana the desires and passions must be suppressed, the most extreme self-renunciation practiced, and the individual must, as far as possible, forget his own personality. In order to attain Nirvana eight conditions must be kept or practiced: right view, right judgment, right language, right purpose, right profession, right application, right memory and right meditation.

The five fundamental precepts of the Buddhist moral code are not to kill, not to steal, not to commit adultery, not to lie and not to give way to drunkenness, to which are added five others of less importance, binding more particularly on the religious class, such as to abstain from repasts taken out of season and from theatrical representations. There are six fundamental virtues to be practiced by all men alike, namely, charity, purity, patience, courage, contemplation and knowledge. These are said to "conduct a man to the other shore." The devotee who strictly practices these virtues has not yet attained Nirvana, but is on the road to it.

The Buddhist virtue of charity is universal in its application, extending to all creatures and demanding sometimes the greatest self-denial and sacrifice, as exemplified in the legend that Buddha, in one of his stages of existence (for he had passed through his numerable transmigrations before becoming "the enlightened"), gave himself up to be devoured by a famishing lioness, which was unable to suckle her young ones. There are other virtues, less important, indeed, than the six cardinal ones, but still binding on believers; lying is forbidden; evil-speaking, coarseness of language and even vain and frivolous talk must be avoided. The essential theories of Buddhism are the theory of transmigration (borrowed from Brahmanism), which is so complete that a worm may become a supreme Buddha; the theory of the mutual connection of causes, and the theory of Nirvana.

Buddha did not leave his doctrines in writing; he declared them orally, and they were carefully treasured by his disciples and written down after his death. The canon of the Buddhist scriptures, as we now possess

it, was the work of three successive councils and was finished at least two centuries before Christ. Buddhism was pure, moral and humane in its origin, but it came subsequently to be associated with idolatrous worship of its founder and other deities. In many things it ranks next to the Christian religion, but it is selfish, in that all these acts of wisdom are for the individual himself, in order that he may gain annihilation. Although now long banished from Hindustan by the persecutions of the Brahmans, Buddhism prevails in Ceylon, Burmah, Siam, Anam, Tibet, Mongolia, China, Java and Japan, and its adherents are said to number 500,000,000.

BUDGET, *bu'jet*, an official summary of the finances of a country, with a statement as to the expected receipts and expenditures for the year to come. The necessity for such orderly presentation rests upon the fact that in all constitutional governments the people have the final decision as to raising money and are in full control of the national finances. In Great Britain the budget is presented to the House of Commons by the Chancellor of the Exchequer; in Canada by the Minister of Finance. In the United States until 1921 the budget system had often been urged upon Congress, but never adopted. In the above year a budget law was passed. President Harding appointed Gen. Charles G. Dawes Director of the Budget, and gave him authority over even Cabinet officers in investigations which might result in the preparation of a budget which would reduce the huge national expenditures. To "balance the budget" is to provide that expenditures shall not exceed anticipated receipts.

The Private Budget. The preparation of a budget for private or family spending is one of the wisest forms of thrift and economy. Careless, haphazard spending breeds extravagance; spending according to a well-planned budget makes for increase in efficiency, more comfort, the elimination of waste and a better-balanced life. An itemized statement should be made for each month, showing the total income, the allowance for rent, table, gas, telephone, clothes, recreation, etc., and the amount which can be saved. This budget should be intelligently and carefully followed, for it is living up to a budget, not merely preparing one, that results in financial independence.

BUELL, *bu'el*, DON CARLOS (1818-1898), an American military leader, conspicuous in

the Civil War. He was a graduate of West Point, and saw active service in the Mexican War. At the outbreak of the Civil War Buell was appointed brigadier-general of volunteers, and was soon placed in command of the Department of the Ohio. In February, 1862, he occupied Nashville, was later raised to the rank of major-general of volunteers, and in April gave Grant conspicuous aid at the Battle of Shiloh. Two months later Buell was placed in charge of the Army of the Ohio, and during the summer was engaged in driving Bragg out of Kentucky. Because of adverse criticisms regarding his pursuit of the Confederates, he was tried by a military commission, which reported against him. On June 1, 1864, he resigned from the service.

BUENA VISTA, *bwa'na vee's'ta*, BATTLE OF, an important battle of the Mexican War, between an American force of 5,000, under General Zachary Taylor, and a Mexican army of 17,000, under Santa Anna. It was fought on February 22 and 23, 1847. The Mexicans were the first aggressors, making several unsuccessful attempts to dislodge Taylor from a strong position on Angostura Heights. One of these attempts was all but successful, only the poor generalship of Santa Anna saving the Americans from defeat. On the second day the Mexicans were driven from the field. The losses of the Americans were about 750; of the Mexicans, fully 2,000. The battle was the last important engagement of the northern campaign, and gave the Americans control of North-eastern Mexico.



BUENOS AIRES, *bway'nohs i'raz*, or *bo'nus a'riz*, ARGENTINA, a beautiful city on the Rio de la Plata, capital and largest city of one of South America's most progressive republics. Next to Paris, Buenos Aires is the largest Latin city in the world, and it is first in population among the cities south of the equator. It is situated 175 miles from the mouth of the river, but as the stream is nearly thirty miles wide at this point and navigated by largest vessels, the place is to all intents and purposes an ocean

port; its foreign trade is large and is rapidly increasing. It is also an important railroad terminal, the principal one in Argentina.

Buenos Aires lies on a broad, level plain, and occupies nearly seventy-three square miles. It is a well built city, with handsome boulevards, parks, fine public buildings and many luxurious private homes. In the oldest sections one may see the typical Spanish home, with open court and heavily-barred windows. The Plaza de la Victoria, 1,200 feet long and 640 feet wide, occupies a prominent position in the central part of the city and is surrounded by public buildings, among which are the hall of Congress, the government palace, the municipal building and the departmental palace, the Hotel Argentine, the Episcopal palace and the Cathedral. There are, besides these buildings, a number of Roman Catholic and Protestant churches and about twenty theaters. The educational institutions include the national university, considered the finest in South America, a normal school and numerous public and private schools. Buenos Aires is the leading manufacturing town of South America, and its industries give employment to over 118,000 men. Among the manufactures are machinery, carriages, leather, boots and shoes, textiles, hides, tobacco and spirits. The population in 1933 was 2,214,702.

In the early months of 1919 Argentina, and particularly Buenos Aires, was seriously affected by the virus of bolshevism, which was spreading with such rapidity that it threatened the security of all human society. Riots occurred in the city as serious as those in parts of Germany, but they were put down by the military, after the destruction of considerable property and the loss of a number of lives.

BUFFALO, a name given to several species of wild cattle, the best known of which is the common or Indian buffalo, larger than the ox and with stouter limbs, originally from India, but now found in most of the warmer countries of Asia. The buffalo is less docile than the common ox and is fond of marshy places and rivers. The female gives much more milk than the cow, and from milk the *ghee*, or clarified butter, of India is made. The hide is exceedingly tough, and a valuable leather is prepared from it, but the flesh is not very highly esteemed. A smaller variety

of this species, called the *carabao* (which see), is found in the Philippines, where it is used as a beast of burden. The *Cape buffalo* of Africa is distinguished by the size of its horns, which are united at their bases, forming a great bony mass on the front of the head. It is the largest and fiercest buffalo known.

Bison, or American Buffalo. As late as 1870 large sections of the western plains of the United States were black with herds of the American buffalo, whose scientific name is *bison*. According to the zoölogist, the bison



THE AMERICAN BUFFALO

is technically not a buffalo, because of differences in structure. The bison has fourteen ribs, one more than the buffalo; and its head, neck and shoulders are heavier and its withers lighter than those of the Old World species. In common speech, however, the name bison is less generally heard than the other name. A full-grown male of the American species is six feet high at the shoulders, and weighs 2,000 pounds. Its head, neck and shoulders are clothed with a thick growth of dark brown hair, and it has a great hump or projection over its fore-shoulders. The tail is short and tufted at the end, and the horns curve upward. In pioneer days the skins of the buffalo, dressed with the hair on, were used by the whites and Indians as robes and overcoats, and the Indians highly esteemed the flesh of the animal. The great herds of the plains have disappeared, but a few specimens may be seen in zoölogical gardens, and there are several hundred in Yellowstone National Park, and about 8,000 in Buffalo Park (Canada), under government protection.



BUFFALO, N. Y., the county seat of Erie County, the second largest city of New York and in 1930 eleventh in size in the United States, is situated at the eastern end of Lake Erie, at the head of the Niagara River. It is twenty miles southeast of Niagara Falls, 439 miles northwest of New York and 523 miles slightly northeast of Chicago. As the western terminal of the New York Barge Canal, it has direct water connection with the Atlantic, and it also enjoys boat connection with all the great lake ports, and Canadian ports by means of the Welland Canal. Twelve trunk lines enter the city, among which are the Buffalo, Rochester & Pittsburgh, the Delaware, Lackawanna & Western, the Erie, the Lehigh Valley, the New York Central, the Pennsylvania and the Wabash. Buffalo's municipal airport is an important station in the nation's system of airways.

General Description. Buffalo originally grew up about the shallow mouth of Buffalo Creek. This harbor proved to be far inadequate to the needs of the city, and it has been deepened, and enlarged by the construction of a ship canal extending southward from it parallel with the shore of the lake. The city now has over ten miles of improved wharfage and thirty-seven miles of waterfront. A series of breakwaters into the lake create outer and inner harbors, one of these breakwaters, built by the United States government, being the longest in the world.

The city is pleasantly situated on a rise of land sloping gently from the lake, affording a pleasing outlook over the water and the Canadian shore. Broad, well-paved streets with many large shade trees add to the general attractiveness of this prosperous city. Main street, the principal business thoroughfare, runs north and northeast from the lake front to the city limits. North, Summer, Ferry streets, Richmond avenue, Delaware avenue and Lincoln Parkway are among the principal residence streets, and Niagara street is a through highway to the northern suburbs. Main, Niagara and several other streets meet at Shelton Square, an important business center.

Parks and Boulevards. Buffalo has a

total park area of almost 1,400 acres, and its larger parks are joined by handsome boulevards. On the north side of the city is Delaware Park, where the Pan-American Exposition was held in 1901; among its attractions is a lake of forty-six acres. "The Front" is a beautiful park area of forty-eight acres along Lake Erie. Water Park, west of Delaware Park, contains 136 acres. In the eastern part of the city is Humboldt Park, and on the south side are South Park, with its magnificent conservatory, and Cazenovia Park. In the environs of Buffalo are such popular resorts as Niagara Falls, Crystal Beach and Fort Erie Beach (in Canada).

Buildings and Institutions. Buffalo has a large number of handsome public buildings. Among the more important of these are the city hall, completed in 1932, at a cost of \$7,000,000, the Buffalo City Hospital, the Chamber of Commerce, the 106th and 174th regiment armories, the state hospital for the insane, the Ellicott Square building, covering a city block, the New York Telephone, Rand, Marine Bank, Liberty Bank, Genesee, Electric and Iroquois buildings and a large number of churches, clubs, hotels and theaters. The elevated portions of the city are also notable for the many fine residences which they contain.

The educational institutions include excellent public schools, schools for manual training, domestic arts and vocational training. There are many private schools and academies and several institutions of collegiate rank, including the State Teachers College, the University of Buffalo and Canisius College. There are about seventy-five philanthropic institutions, prominent among them being the Buffalo Orphan Asylum, German Orphan Asylum (Roman Catholic), Saint Vincent's Asylum, Saint Mary's Institute for Deaf-Mutes, Memorial Hospital, Children's Hospital, and the Sisters of Charity Hospital. The Buffalo General Hospital is one of the largest city hospitals in the country. The city also owns a special tuberculosis hospital. The Buffalo Public Library and the Grosvenor Library, also open to the public, together contain over 700,000 volumes. The Buffalo Historical Society and the Albright Art Gallery each occupy magnificent marble structures in Delaware Park.

Commerce and Industry. Buffalo is not only one of the greatest American ports, but

It is one of the most important in the world with an annual tonnage approaching 20,000,000. Immense quantities of wheat, flour, lumber, ore and fish are carried to the city by way of the Great Lakes and from there shipped to other cities. Buffalo has grain elevators with a total storage capacity of 36,000,000 bushels, and can take care of 5,000,000 bushels a day. It is also one of the foremost American live-stock markets. In manufactures of all sorts it ranks next to New York among the cities of the state, and in iron manufacture is second only to Pittsburgh. About 22,000 men are engaged in the manufacture of foundry and machine-ship products. One of the largest steel plants in the world is located in one of Buffalo's suburbs, Lackawanna. As a market for linseed oil Buffalo holds first rank among American cities. The rapid development of the city as a manufacturing center was due partly to its favorable situation in regard to shipping, and partly to the abundance and low unit-cost of power provided by the falls of the Niagara.

History. The site of the city was first visited by La Salle in 1679. In 1758 the first white settler appeared, and after the Revolution the locality became a center for fur traders. Between 1798 and 1803 the township was laid out. The growth of the settlement was slow, and in 1813 it was completely destroyed by the British. Two years later the town was rebuilt, and after the completion of the Erie Canal, in 1825, is developed steadily. In 1832 it was chartered as a city, and eleven years later erected the world's first grain elevator. In 1901 the Pan-American Exposition was held at Buffalo, during which President McKinley was fatally shot. Population, 1920, 506,775; in 1930, 573,076.

BUFFALO BILL. See CODY, WILLIAM FREDERICK.

BUFFALO GRASS, a hardy, nutritious North American grass, so called because it once formed a large part of the food of the buffalo, or bison. The blades of this grass are about six inches long, and when burned by the summer sun they become crisp, curly and light brown in color. It is still a valuable fodder on the cattle ranges of the West.

BUG, the name given to any insect belonging to the order Hemiptera. The beak is bent toward the breast and is adapted for sucking or piercing. Among the most com-

mon and troublesome bugs are the bedbug, chinch bug and louse. In the United States the word is used synonymously with beetle (which see).

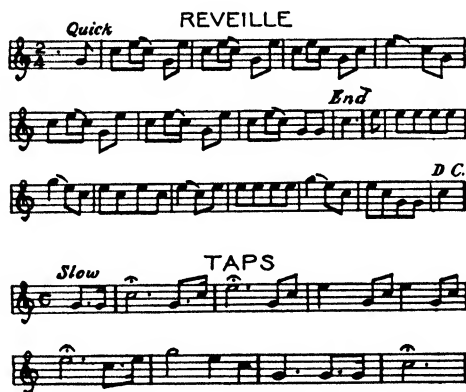
BUG'GY, in the United States the name given a light, one-horse, four-wheeled vehicle, with or without a top or hood. In England, however, the term means a light, one-horse,



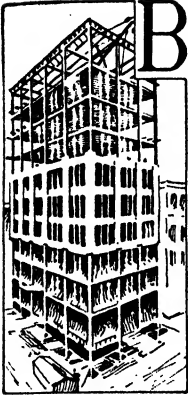
TOP BUGGY, NOW SELDOM SEEN

two-wheeled vehicle, with or without a hood, such as, in the United States, is called a cart.

BUGLE, *bu'g'l*, a wind instrument, resembling the trumpet but having a shorter tube and a smaller bell-shaped opening. Its note has a penetrating quality which makes it a good instrument for military calls and signals. In peace the soldier is reminded of every routine duty by a special call from a



bugler, while in war, in addition, his marches and movements are directed and guided by its calls. *Reveille* is the first call of the day and its purpose is to awaken the soldiers. *Taps* is the last call of the day. Besides these there are calls of warning, of formation, of service, etc.



BUILDING, *build'ing*, the art of constructing buildings; also, the structure erected. Building includes all those mechanical operations necessary to fashion or construct the materials and to erect these materials into a finished structure. The most important trades connected with building are carpentry, masonry, brick-laying, plastering, iron-working, quarrying, painting and glazing. Taken together,

these are often spoken of as the *building trades*. There are also numerous other industries closely related to building, but classed as manufactures, such as the making of brick, glass, nails, screws and other hardware, all of which are used in building.

The main parts of a building are the foundation, the body and the roof. The *foundation* is of great importance. It must be solid, immovable. The construction of foundations for small buildings is a simple matter. They are made of brick, stone or wood, but the last is seldom used except for temporary structures. Stone or brick foundations are laid in trenches, which should be deep enough to extend below the frost line. For country buildings rough stones called *rubble* are often employed.

The foundations for large buildings, such as those erected in cities, often require the greatest of engineering skill. They must be sufficiently strong to support the great weight of the building and must rest upon soil or rock which is unyielding. The kind of foundation in such cases depends very largely upon the nature of the soil and the weight of the structure. Where a firm foundation cannot be reached except by excavating to a great depth, piles are often used. These are driven down until they reach a rock or other layer which will hold them firmly, their tops are then fastened together by wooden or iron beams, and the space between is filled with concrete. This makes a very firm foundation and one which will support a building of great weight. A more recent plan is to use concrete pillars instead of piles. These are made by excavating a round hole, until the rock below is reached, and then filling this with concrete, so as to make a firm support. The

supports of the building are then placed upon these concrete pillars. Sometimes foundations must extend over 100 feet underground.

The *body* of the building is designed to meet the requirements for which the structure is erected. It may be of wood, brick or stone. When the exterior walls are of brick or stone they seldom need a frame, and the framework necessary is that for supporting the partitions and floors. However, if the building is of wood, the frame is erected first, then this is covered on the outside with boards and siding, and on the inside with lath and plaster. The partitions are built in a similar way. In large cities buildings are now generally constructed with steel frames. The frame consists of girders of rolled steel, which are strongly riveted together and braced. These girders contain ledges, upon which the brick or stone forming the exterior walls is supported. Such buildings are very strong and contain much less material in the exterior walls than would be necessary were the steel frame dispensed with. By using tiling for partitions and floors, steel-frame buildings can be made so that they are practically fireproof. This method is now practically universal in large office buildings. Buildings of thirty or more stories are now common in the great cities, the Empire State Building in New York City rising to a height of 1,248 feet, including the tower, or 102 stories.

The style of *roof* of the building depends upon the size and style of the building. Small buildings usually have roofs sloping from the middle downward to the sides, forming what is called a double roof. The triangular ends of such buildings are known as *gables*. Tall buildings have a flat roof, which has a slight incline to one side. Roofs are covered with shingles, slate, tin or tar and gravel. Shingles and slate are generally used for steep roofs, and tin or gravel for flat roofs.

Related Articles. Much additional information relating to building will be found in the articles, *Architecture*; *Building Laws*; *Building Stone*; *Lumber*.

BUILDING AND LOAN ASSOCIATIONS, or BUILDING SOCIETIES, joint stock benefit societies for the purpose of raising by periodical payments a fund to assist members in obtaining homes. These are mortgaged to the society till the amount of the shares drawn on shall be fully repaid

with interest. These societies may be divided into two classes, *proprietary* and *mutual*. The former take money on deposit, paying interest therefor, and give loans for building purposes, or the like, repayable by installments. The profit of the company lies in the difference between the rate charged to the borrowers and the rate paid to depositors.

As agencies for encouraging thrift, building associations have been very successful. They have been instrumental in making home-owning possible by hundreds of thousands of people who otherwise would never have been able to buy or own a home. The largest number of associations was 12,904, in 1927; the largest membership, 12,350,928, in 1930; the greatest total assets in any year, \$8,828,611,925, in 1930. During the depression years (1930-1935) failure overtook about 8 per cent of the associations; they now number nearly 10,800.

BUILDING LAWS. In an earlier day men could construct buildings without due regard to the wishes of their neighbors, or without due consideration for health and sanitation. They were practically a law unto themselves, as they are still in many communities. However, in congested districts particularly, and quite generally throughout large cities, much consideration has been given to many elements affecting the public welfare and public health, as well as to aesthetic considerations.

In attractive residence localities there may be legal specifications requiring houses to be set back a certain number of feet from the road; residences must not be placed nearer than a certain number of feet from each other, in order to give light and air; to protect against fire large cities do not permit construction of wooden buildings. In most cities there is no restriction upon the height to which business blocks shall be built; there is no such restriction in New York, and that city has become noted for the tallest buildings in the world. By utilizing the step-back principle, by which the width and length of buildings is decreased after reaching a certain height, many buildings have been erected with narrower superstructures above the main mass, sometimes terminating in a narrow ornamental tower. This method is observed in the famous Woolworth building, and in the more recently erected buildings in Manhattan,

notably in the Empire State building, 1,250 feet high, the Chrysler building, 1,046 feet high. In many cities the height of buildings is limited by ordinance.

Restriction of height of buildings in business districts is deemed essential to provide for free circulation of air and the entrance of light, both being conditions of health. In most cities no building reaching four stories in height can be without conveniently-located fire escapes. Frequently laws will declare how buildings shall be lighted and how they shall be drained, in order that sanitary conditions may be assured and that possibility of disastrous fires may be diminished.

BUILDING STONE, a class of stones used in the construction of foundations and walls of houses, in making bridges and piers, and in interior finishing. Each of the stones in common use has its particular virtues, possessing qualities which make it adapted to certain purposes. Strength, durability and beauty are some of these qualities. The selection of a stone also depends upon the ease with which it may be quarried, and its accessibility.

The most durable stone known is granite, and it is especially desirable for foundations supporting heavy weights. Imposing public buildings of massive structure are often made of granite. Limestone is a valued stone for trimmings and for foundations and walls not demanding so heavy a stone as granite. One of the most pleasing decorative stones is marble, which is limestone purified and crystallized by heat. Sandstone (brownstone) is a popular material for city dwellings of the more pretentious class, and slate is widely utilized in making sinks and mantels. Most of these stones are described elsewhere under special headings.

All stones are subject to deterioration from the weather, but the different varieties show wide variation in this respect, as indicated by the following table:

VARIETY	LIFE IN YEARS
Coarse brownstone	5 to 10
Fine brownstone	20 to 50
Coarse fossiliferous limestone.....	20 to 40
Marble, coarse dolomitic.....	40 to 50
Marble, fine	50 to 100
Granite	75 to 200
Best Ohio limestone.....	100 to 200
Nova Scotia limestone.....	50 to 200

BUKOWINA, *boo ko ve'nah*, until late in 1918 a crownland and duchy of the Austrian

empire. On the dissolution of the dual monarchy of Austria-Hungary, toward the end of the World War, Bukowina was claimed by Rumania as a part of its reorganized state. It was awarded to Rumania by the peace conference which began sittings in Paris in 1919. Bukowina lies west and north of the Rumanian boundaries as they existed in 1914. It has an area of 4,031 square miles, about half that of New Jersey, and a population of 845,900 (Census of 1930). Czernowitz, the capital city, is the seat of one of the four Rumanian universities.

The principal rivers are the Pruth, Sereth and Dniester. The soil in their valleys is very fertile, and the crownland produces good crops of cereals, fruits and vegetables. Cattle raising, milling and the manufacture of liquor are important industries. Bukowina was the scene of serious fighting during the World War. In June, 1916, it was completely occupied by Russian troops, but the following year the Russians were driven out by Austro-German forces. From that date to the dissolution of Russia following the abdication of the czar, the Austro-Germans held the country only by constant vigilance and frequent severe and costly fighting.

BULB, a modified leaf bud formed on a plant, either upon the ground or beneath its

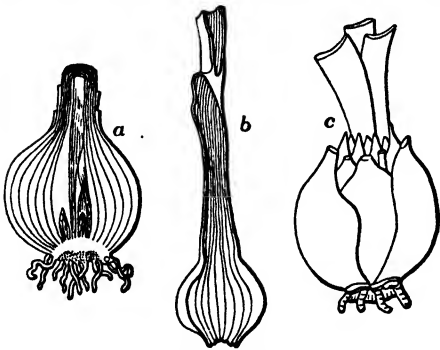


BULGARIA, one of the Balkan states of Southern Europe and one of the most powerful members of the group during the early years of its brief history as an independent nation. It was popularly referred to as "the young giant of the Balkans," but participation in three wars between 1912 and 1918 left it on the loser's side in two of the struggles, stripped it of some of its territory, and lowered its prestige

among the nations of the continent (see *HISTORY*, below). The area of the country at the height of its power (1913) was 43,305 square miles. According to the boundaries existing at that time it lay south of Rumania, east of Serbia, north of Greece and the Aegean Sea, and west of the Black Sea and European Turkey. After the war Bulgaria lost direct access to the Aegean Sea.

Bulgaria is one of the states which fought their way from the status of Turkish dependencies to the position of free and independent nations. During the concerted drive against Turkey in 1912-1913 in the Balkan Wars it was perhaps the most intrepid member of the coalition against the Ottomans. The coalition turned against Bulgaria after victory had been won from the Turks; this is one of the ironies of a situation which greatly influenced it when Germany sought its aid in 1914.

The People of Bulgaria. The great majority of the inhabitants of the country are Bulgarians. Next in point of number are the Turks, of whom there are over 400,000; Rumanians, Greeks, Gypsies and other European nationalities comprise the remainder. The Bulgarians are a strong, broad-shouldered race, whose stocky build suggests their dominant national trait—solidity of character. In complexion and features they are more Oriental than European, but they have none of the vices of the Orient. On the contrary, they are passionate lovers of education, their moral standards are high, and they are industrious and thrifty. The mass of the people are peasants who practice various forms of agriculture. In 1935 the population was 6,090,215.



BULBS

a, section of onion bulb; b, leaf from onion bulb; c, bulb of lily.

surface. Roots grow from the base, and from the center a stem grows. The bulb is formed by the bases of leaves or by thin coats and layers, which are, in reality, modified leaves. The function of a bulb is to store nourishment to enable plants to complete their growth more rapidly than would be possible from the seed. The onion, tulip and common lily are good examples of bulb plants.

Education and Religion. Primary education in Bulgaria is free and compulsory. In the higher grades only the rich pay fees. Schools corresponding to high schools have been established in all the large towns, and at Sofia there is a university. At Philippopolis, the ancient Philippi of the New Testament, there is a boy's high school and there is an excellent girls' school in the same town. However, illiteracy is high. About forty per cent of the people cannot write. The national religion is the Orthodox Greek, but the State Church is outside the jurisdiction of the Patriarch of Constantinople (see GREEK CHURCH). Though the great majority of the people belong to the Orthodox Church, several other religious bodies are represented, especially the Roman Catholic, Protestant, Gregorian Armenian, Jewish and Mohammedan.

The Land. There are three distinct physical divisions—the valley of the Danube in the north, the Balkan Mountains farther south, and the lowland region bordering the Aegean Sea. The Balkan Mountains are responsible for two distinct climatic zones. In the northern section between the Danube and the mountains there are long, severe winters, and the skies are clouded most of the time. Beyond the mountain barriers, however, a temperate climate prevails, and the valleys of the southern slopes are fragrant and beautiful with roses. These are cultivated by the hundreds of thousands for the perfume trade (see ATTAR). In the extreme south one finds a mild climate similar to that of Italy.

Resources. The valley of the Danube and that of the Maritza, which drains Southern Bulgaria (or Eastern Rumelia), are among the most fertile sections of the Balkan peninsula, and agriculture is an industry of first importance. The farmers themselves own the land, and the great majority of the farms are less than fifty acres in extent. Wheat, the most important grain crop, is followed in order by maize, barley, rye and oats. Potatoes are raised in large quantities, and rice and cotton are important products in the south. Other branches of agriculture are tobacco growing and bee-keeping. The silkworm industry is also carried on; the cultivation of roses has already been mentioned. Of late years the yield in all lines of agriculture has been stimulated by the introduction of improved farm im-

plements. Bulgaria also has splendid mountain forests of oak, pine and beech.

All minerals are state-owned. Several rich coal mines are in operation, and over 1,000,000 cubic yards of stone are quarried annually. Other mineral products are iron, lead, aluminum, and salt.

Transportation and Commerce. At the conclusion of the Balkan Wars there were 1,486 miles of railway in operation, and by 1935 this had increased to 1,917. Sofia is connected by rail with the general European system, and plans have been made to connect the Danube River and the Aegean Sea. The principal ports of the country are Varna and Bourgas on the Black Sea, and Rustchuk, Sistor and Vidin on the Danube. A large portion of Bulgaria's foreign trade is with Germany and Austria-Hungary. The principal exports are wheat, live stock, attar of roses, woollens, skins, dairy products, silk cocoons, tobacco and timber. Manufactured goods are imported in large quantities.

Government. Bulgaria was established as a constitutional monarchy, and remained so until 1934, when King Boris, in order to preserve the peace of the country, established a dictatorship. He promised a return to parliamentary government as soon as the stress had passed. The national assembly, the *Sobranje*, is a single chamber, and its members are elected by the male population. The king is invested with high powers, and Boris has been watchful for the best interests of his subjects.

History. Bulgaria came under the rule of the Turks toward the close of the fourteenth century. In 1878, by the Treaty of Berlin, it was created a principality under the suzerainty of the sultan, and by the same treaty Eastern Rumelia (Southern Bulgaria) was created a dependency of the Ottoman Empire. In 1885 a revolution in Eastern Rumelia overthrew the Turkish rule and a union of the two states was proclaimed. Ferdinand of Saxe-Coburg, an officer in the Austrian army, was offered the throne in 1886, and the following year he accepted it, assuming the title of prince. In 1896 the powers formally recognized him, and when United Bulgaria declared its independence, in 1908, he became Ferdinand I, with the title of king. In 1909 the European powers and Turkey gave him formal recognition.

The Balkan War of 1912-1913, in which Serbia, Montenegro, Greece and Bulgaria



WHAT YOU MAY SEE IN BULGARIA

Travel Magaz.

At top, one of the many mosques of the country, this one in Sofia, indicating the Mohammedanism of many of its people. At bottom, in the summer heat, tobacco is cured in a unique manner; it is festooned over the street, as protection from the burning rays of the sun.





EVERYDAY SCENES IN BULGARIA

At top, gathering roses to make the famed attar of roses, for which Bulgaria is particularly noted; center, bringing wool to town to sell in the market-place; below spinning yarn, in a country where cloth and clothing are made at home.

Travel Magazine—Ewing Galloway



forced Turkey to give up most of its European territory, was a sore disappointment to Bulgaria because Serbia was awarded territory which had been promised to Bulgaria by a secret arrangement between these two nations. A second war broke out in June, 1913, in which the allies, reinforced by Rumania, leagued themselves against Bulgaria. That nation was too exhausted to maintain an effective resistance against so many enemies, and was obliged to agree to an unfavorable peace treaty. After the outbreak of the World War both the entente and the central powers maneuvered for Bulgaria's support, and both sides made promises of territorial additions. The central powers were the more successful bidders, however, and in October, 1915, Bulgaria entered the war as an ally of Germany, Austria-Hungary and Turkey. The same month Bulgarian troops invaded Serbia and coöperated with the Austro-German armies in the subjugation of that country.

Until late in 1918 Bulgaria maintained its military supremacy in the Balkan Peninsula, as the allies, even after Greece joined the entente, did not feel strong enough to break through on the "Eastern Front." The addition of America's great army, however, the force of which was first felt in the summer of 1918, changed the situation completely. In July, Italian and French troops cleared Southern Albania of the enemy, and in September a concerted allied attack was begun against the Bulgarian forces in Macedonia and Serbia. On September 26 the Bulgarians asked for a suspension of hostilities, and in a few days they surrendered unconditionally. This move cut off German communications with Turkey, and paved the way for the utter collapse of the Quadruple Alliance.

King Ferdinand, depressed and in bad health, abdicated on October 3, and was succeeded by his son Boris I. Conditions were turbulent throughout the country for weeks afterward, and it was reported that a republic had been established. The facts were that a Cabinet was formed of democratic leaders who desired a republic, but that Boris was permitted to keep the throne because he gave evidence of being thoroughly in sympathy with democratic ideals. A strong faction in Bulgaria hoped for a time to join the country to Yugoslavia. Bulgaria was stripped of some of its territory by the peace treaty of 1919. Thrace and some land on the Aegean

Sea were given to Greece, and its area was reduced to 39,825 square miles; nearly 3,500 square miles of its richest territory was lost.

In 1924 the government made a treaty with Greece by which Bulgaria was given an outlet to the Aegean Sea on the south through a long corridor leading to the port of Kavalla.

Related Articles. Consult the following titles for additional information:

Balkan Wars	Sofia
Serbia	World War

BULL, a letter, edict or rescript of the Pope. It is published or transmitted to the churches over which he is the head, and contains some decree, order or decision. In many cases a leaden seal, impressed on one side with the heads of Saint Peter and Saint Paul, on the other with the name of the Pope, is attached to the bull. If the bull be a "Bull of Justice," the seal is attached by a cord of hemp; if a "Bull of Grace," the cord is of red or yellow silk. Pope Leo XIII ordered the use of ordinary instead of Gothic characters on the less important bulls.

BULL, JOHN. See JOHN BULL.

BULL, OLE BORNEMANN (1810-1880), a famous violinist, born at Bergen, Norway, who achieved great triumphs both in Europe and in America, chiefly on account of his wonderful technique, which probably has never been surpassed. Though self-taught, he gained by close study a thorough acquaintance with the old masters, and his interpretation of their works was unusually appreciative.

BULLARD, ROBERT LEE (1861-), an American military officer, one of the first corps commanders appointed under General Pershing on the organization of the American field army in France in 1918. Bullard was born in Youngsboro, Ala., and was educated at the Agricultural and Mechanical College of Alabama and at West Point Military Academy. After his graduation from the latter institution, in 1885, he was assigned to the Tenth Infantry, and subsequently served in the old commissary department. In the Spanish-American War he was colonel of the Third Alabama Volunteers, and after being mustered out, in August, 1899, was appointed colonel of the 39th United States volunteer infantry, which saw active service in the Philippines. Bullard was in action under General Pershing against the Moro tribes, and at this period

he had many narrow escapes from death.

In 1916 he served in Texas in connection with the border disturbances; in June, 1917, was appointed brigadier-general in the regular army, and the following month was made a major-general in the national army. In August, 1918, when the first American field army was organized in France, General Bullard was given command of the second corps, and he contributed materially to allied victory of the same year. He was raised to the rank of lieutenant-general for the duration of the war, and retired in 1925.

BULLDOG, a variety of the common dog, having a short, broad muzzle and a projecting lower jaw which causes the lower front teeth to protrude beyond the upper. The head is massive and broad, the lips are thick and loosely hanging, the ears drooping at the extremity, the neck thick and short, the body long and stout, and the legs short and sturdy. The bulldog has a very obstinate nature, and when once it has fastened its teeth in an enemy it will hold on in spite of severe punishment. For this reason it is often employed as a watchdog and was formerly used in the barbarous sport of bull baiting. Bulldogs show great affection for their masters, but are liable to be surly and vicious with strangers. The *bull terrier* came originally from a cross between the bulldog and terrier. It is smaller than the bulldog, lively and very courageous.

BULLET, a projectile intended to be discharged from such firearms as a rifle, musket, pistol or revolver. The bullet made for the modern rifle is conical in shape; it consists of a copper core with a covering of nickel or steel. The size depends upon the caliber of the rifle used. Bullets made for revolvers are shorter and heavier, and are more dangerous in effect at short ranges than rifle bullets.

Dumdum Bullets, so called because they were first made at the Dumdum arsenal, in India, are missiles having an uncovered leaden core and a casing weak at the apex. Such bullets spread out on striking a bone, tearing the body and usually causing death. Their use is forbidden by the Hague warfare regulations. Bullets used for hunting, however, often have hollow points, to insure spreading when they strike the game.

BULLFIGHTING, one of the favorite diversions of the Spaniards. The fights are usually held in an amphitheater having cir-

cular seats rising one above another, and are attended by vast crowds who eagerly pay for admission. The combatants, who make bullfighting their profession, march into the arena in procession. They are of various kinds—the *picadores*, combatants on horseback, in the old Spanish knightly garb; the *banderilleros*, combatants on foot, in gay dresses, with colored cloaks or banners; and lastly, the *matador* (the killer). As soon as the signal is given, the bull is let into the arena. The *picadores*, who have stationed themselves near him, commence the attack with their lances, and the bull is thus goaded to fury. Sometimes a horse is wounded or killed and the rider is obliged to run for his life.

The *banderilleros* assist the horsemen by drawing the attention of the bull with their cloaks and try to fasten on the bull their *banderillas*—barbed darts ornamented with colored paper, and often having squibs or crackers attached. If they succeed, the squibs are discharged, and the bull races madly about the arena. In case of danger they save themselves by leaping over the wooden fence which surrounds the arena. The *matador* now comes in gravely with a naked sword and red flag and aims a fatal blow at the animal. The slaughtered bull is dragged away and another is let out from the stall. During the season at Madrid there is at least one fight a week, and eight or more bulls are sacrificed in a single afternoon. It is not often that a man is injured. To one not accustomed to these fights, they are nerve-racking spectacles. It is said that King Alfonso of Spain fainted the first time he witnessed one.

BULLFINCH, a cage bird which is valued because of its ability to reproduce a great variety of musical airs. Its body is a bluish-gray, with bright red on the breast. The crown of the head is black, as is also the short, thick, rounded bill. Bullfinches are found wild in Britain, Southern Europe and Asia. In Germany, especially, bullfinches are very popular, and trained birds command good prices.

BULLFROG, a frog found in most parts of the United States and Canada, but chiefly abundant in the Southern states. It sometimes reaches a length of seven or eight inches, and is of an olive-green or reddish-brown color, with large brown or black spots and with a yellow line along the back. It receives its name from the remarkable loud-

ness of its voice, which is a hollow bass that can be heard distinctly for a long distance. The bullfrog inhabits swamp lands around lakes. In feeding it does not confine itself to insects and worms, as do the smaller frogs, but eats fish and other frogs and the young of birds and animals. The hind legs of the frog are often used as food and also as bait for fish.

BULLHEAD. See CATFISH.

BULLION, *bul'yun*, gold and silver in some form other than legal tender coin. The term may be applied to gold and silver bars, gold dust or nuggets, gold or silver plate, and to gold or silver coins of a foreign country—in fact, any form of these metals which may be taken to a mint and made into coins. A large proportion of the gold shipped from the United States is in the form of bars, and the vast gold reserves of the European banks are partly in this form.

BULL MOOSE PARTY. See PROGRESSIVE PARTY.

BULL RUN, BATTLES OF, two important battles of the Civil War, fought near Bull Run, in Northeastern Virginia. The first, occurring July 21, 1861, was the first important battle of the war. The Confederates, to the number of 31,000, were posted along Bull Run Creek. McDowell, who was commanding 28,000 Union soldiers, determined to attack their position, and he began by sending Tyler, Heintzelman and Hunter to turn the Confederate left wing. This movement was successful, but McDowell failed to follow up his advantage by occupying the strategic position at Manassas Junction, and chose to follow the fleeing enemy. After a time the Federals were repulsed by the forces of General Jackson, who there gained his sobriquet of "Stonewall." With the aid of reinforcements, Generals Joseph Johnston, Beauregard, Jackson and Kirby Smith directed a fresh attack and completely routed the Union forces. The second Battle of Bull Run, also known as the Battle of Manassas, occurred August 29 and 30, 1862, between an army of 40,000 men, under General Pope, and a somewhat smaller Confederate force under "Stonewall" Jackson. General Longstreet reinforced Jackson at nightfall, and on the following day the exhausted Union troops were compelled to retire, leaving the Confederates in possession of the field.

BULLS AND BEARS. See BEAR AND BULL.

BULL'S-EYE, a word used to denote three different things. They are:

1. A round piece of thick glass, convex on one side (see Lens), inserted into the decks, ports or skylight covers of a vessel, for the purpose of admitting light.

2. A small lantern with a lens in one side of it, to direct the light in any desired direction.

3. In shooting, the center of a target, of a different color from the rest of it and usually round. See Archery.

BULOW, BERNHARD HEINRICH, Prince von (1849-1929), a German statesman and diplomat, who held the office of Chancellor of the Empire for nine years following 1900. He was born in Holstein, where his family were people of considerable prominence. During the Franco-German War von Bülow served in the army, and subsequently held positions in the diplomatic service at Rome, Petrograd, Vienna and Athens. He was one of the secretaries at the Congress of Berlin, which followed the Russo-Turkish War of 1877-1878, and after further diplomatic experience became Secretary of State for Foreign Affairs. In 1900 he attained the Chancellorship.

Von Bülow's ability as a diplomat was conspicuously demonstrated during his service as Chancellor, especially in connection with the negotiations with France about Morocco (which see). He resigned the position, however, in 1909, because the Reichstag refused to accept his proposals for tax reforms. After a period of retirement he was recalled to public life by the outbreak of the World War. Appointed ambassador extraordinary to Italy, he sought zealously to keep Italy from joining the entente allies, but succeeded only in delaying Italian intervention. See WORLD WAR.

BULOW, HANS GUIDO VON (1830-1894), a pianist and composer, born at Dresden. He first studied for the law, but later he adopted music as a profession and studied the piano under Liszt. Bülow made his first public appearance in 1852, with only moderate success, but later became a leading figure in German musical circles. In 1855 he became leading professor in the Conservatory at Berlin, in 1858 was appointed court pianist and in 1867 musical director to the king of Bavaria. His most famous compositions include an overture and music to Shakespeare's *Julius Caesar*, an "orchestral ballad," *The Minstrel's Curse*, a symphonic

poem, *Nirwana*, and numerous songs, choruses and pianoforte pieces. He is considered one of the first of pianists and orchestral conductors.

BUL'RUSH, the popular name for almost any large, rushlike plants growing in marshes. A plant of this group provided material for the little boat that sheltered Moses. The name is most correctly given to a species of scouring rush or equisetum. See HORSE-TAIL RUSH.

BULWER-LYTTON, EDWARD GEORGE EARLE, Lord Lytton (1803-1873), an English novelist, author of many popular stories, but best known for his brilliant *Last Days of Pompeii*. He was also a successful dramatist. From 1831 to 1841 and from 1852 to 1866 Bulwer was in Parliament, and he attained considerable influence. He was made a baronet in 1838, and raised to the peerage as Baron Lytton in 1866. Of Bulwer's plays, some of which have been very popular on the stage, the best known are *Richelieu*, *Money* and the *Lady of Lyons*; among his novels are *The Last of the Barons*, his greatest historical novel; *Rienzi*, *My Novel* and *The Caxtons*. Despite the affectations of Bulwer's style and of his sentiments, his books have always been popular because they have stories of interest to tell.

BULYEA, GEORGE HEADLEY VICKERS (1859-1928), a Canadian statesman, born at Gagetown, New Brunswick; educated in the grammar school of Gagetown and the University of New Brunswick. He went to Winnipeg in 1882 and the following spring to Qu'Appelle, Saskatchewan, where he engaged in business. He was elected to the Northwest Council in 1894 and for many years was a member of the Executive Council. In the territorial government he was commissioner of agriculture and of public works (1899-1905), and on the organization of Alberta as a province he was appointed lieutenant-governor (1905). After two terms in this office he became chairman of the public utilities board.

BUMBLEBEE, a large bee with a thick, hairy body, well known in most parts of the world but particularly numerous in the northern hemisphere, where often it reaches the Arctic regions. Bumblebees live in small colonies, where about half the bees are workers and the remainder males and females. They are not so orderly or perfect in their family life as the honeybees, as may be seen

in the roundish, oval, scattered cells of different size found in a single nest. Bumblebees collect honey and store it, but at the end of the season the colony breaks up and only a few females survive. They are chiefly of value for the aid they render in the cross-fertilization of plants, and it is a curious fact that some species of clover cannot be grown successfully in countries where there are no bumblebees, for no other insect can fertilize the plants. Before Australia could become a clover-growing country its people were obliged to import great numbers of bumblebees.



BUMBLEBEE

BUNDESRAT, *boon'des raht*, the Federal Council of the German Parliament, before the dissolution of the German Empire in 1918, at the close of the World War. The Bundesrat was really a body of ambassadors, as it was composed of delegates sent by the individual states, considered as units. They voted in units, and as instructed by their respective states. A vote cast contrary to instructions was void. There were sixty-one members. See GERMANY, subhead *Government*.

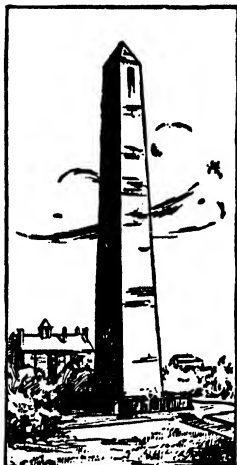
BUNGALOW, in India, a house or residence, generally of a single floor. The native bungalows are constructed of wood, bamboo or like material, but those of the Europeans are generally built of sun-dried bricks and have a thatched or tiled roof. They are often very elegantly and richly furnished and invariably are surrounded by a veranda, the roof of which serves as a protection against the sun, a necessary precaution in a hot climate.

In the United States the name is now commonly applied to houses of only one story, which of later years have become very popular. Inasmuch as the sleeping rooms and living rooms are all on the same floor, the bungalow is a very convenient form of home, but it is not always practicable when ground space is limited. In the article ARCHITECTURE may be found a picture of the exterior of a typical bungalow, together with a ground plan.

BUNION, *bun'yun*, an enlargement and inflammation of the joint of the great toe, arising from irritation of the small membranous sac located there. Bunions, which are usually caused by a tight shoe, begin in a small, tender spot, which swells and, if not cured, may become a very painful sore and cause a permanent deformity of the toe. Shoes that fit the foot are both a preventive and a relief, unless the bunion has been too long neglected. In serious cases bunions can be cured only through a surgical operation, which, though painful, is not dangerous.

BUNKER HILL, BATTLE OF, the first important conflict in the struggle between England and the American colonies, fought on June 17, 1775. The British army of 10,000, under Generals Gage, Howe, Clinton and Burgoyne, was occupying Boston. The American army, 15,000 strong, was commanded by General Artemas Ward, with headquarters at Cambridge. Learning that the British intended to seize Bunker Hill, overlooking Charlestown, the Americans, during the night, quietly fortified the adjoining height, known as Breed's Hill. The British, discovering the redoubt at daybreak, opened fire from their ships of war in Charlestown Harbor. They finally landed a force and advanced upon the position of the Americans, but were repulsed with great loss. A second attack, during which Charlestown was burned, was no more successful. The British rallied for a third attack, and the Americans, after resisting with stones and the butts of their rifles, having exhausted their ammunition, withdrew. General Joseph Warren, one of the most prominent of the patriots, was among the killed. The loss of the British was about 1,000; of the Americans, 450.

On June 17, 1825, Lafayette laid the corner-stone of Bunker Hill Monument, on the summit of Breed's Hill; and Daniel Webster delivered the oration of the day, making one of his greatest speeches. In



BUNKER HILL
MONUMENT

1843, when the monument was dedicated, the day's orator again was Daniel Webster. The cost of the shaft, over \$125,000, was defrayed by popular subscription. The monument is of granite and is 221 feet high. At the top is a chamber reached by a spiral staircase.

BUNSEN, ROBERT WILHELM EBERHARD (1811-1899), a German chemist who made valuable contributions to modern scientific progress. He invented the electric battery and burner (see below) that bear his name, discovered the method of spectrum analysis, and devised a means of making magnesium on a large scale. These are typical of a number of other Bunsen inventions and discoveries.

BUNSEN BATTERY, a form of galvanic battery, the cells of which consist of cleft cylinders of zinc, within which is a porous earthen cup containing a rectangular prism or a rod of carbon. The outer cup, in which the zinc is placed, contains dilute sulphuric acid, and the earthen cup contains nitric acid. This battery works quickly and generates a strong current, but it is now little used, because more convenient patterns have replaced it.

BUNSEN BURNER, a form of gas burner especially adapted for heating, consisting of a tube, in which, by means of holes in the side, the gas becomes mixed with air before burning, so that it gives a nonilluminating, smokeless flame producing intense heat. The principle of the Bunsen burner is very generally employed in homes for cooking purposes.



BUNSEN
BURNER

BUNT, a disease of wheat, which is caused by the attack of a parasitic fungus. It is known also by the names smut ball, pepper brand and stinking smut. The diseased wheat takes on a bluish-green color and does not grow to its full height. The fungus is formed in the ovary of the wheat when the grain is young. It can do much injury to a crop, but can be prevented by careful selection and washing of the seed with water or solutions of copper sulphate, formalin or corrosive sublimate.

BUNTING, the popular name of a group of finches. In Britain the common bunting, or corn bunting is seen in most cultivated districts, and in the Arctic regions the snow

bunting, or snowbird, is one of the few birds to be seen. In the United States the cowbird, or cow blackbird, is frequently called the cow bunting.

BUNYAN, JOHN (1628-1688), an English writer, author of *The Pilgrim's Progress*, one of the world's masterpieces of allegory. He was the son of a tinker, and was born in the village of Elstow, near Bedford. He followed his father's employment, but during the civil war he served as a soldier, probably on the side of Parliament. Having joined, largely through the influence of his wife, a society of Baptists at Bedford, he began preaching among the various dissenting groups in the vicinity. On the restoration of Charles II, severe laws against dissenters were applied, and Bunyan was imprisoned for twelve years (1660-1672) when he refused to retract. In 1675 he was imprisoned again for six months.

During his first imprisonment, Bunyan supported his family by making hoot laces, and in his spare time he devoted himself to writing. *The Pilgrim's Progress*, begun at this period, was completed in 1675. This book has been translated into more than 100 different languages and dialects, and is almost a rival of the Bible in number of copies sold. Written in homely yet vigorous and racy English, with its characters real persons, not symbols, *The Pilgrim's Progress* is an allegory of dramatic power. Bunyan's other works include *The Life and Death of Mr. Badman*, *The Holy War* and *Grace Abounding*, an account of Bunyan's spiritual life.

BUOY, *boo'y*, a floating object constructed of wood or iron and placed as a guide to navigation in rivers and harbors. There are a great many varieties of buoys, each constructed in the manner best suited to its particular purpose. For instance, the *can buoy* is an iron cylinder with a dome-shaped bottom. The *nut* or *nun* buoy is composed of two cones placed base to base. *Spar buoys* are merely wooden poles anchored and held upright by a heavy weight on their lower end. These are used where ice might destroy or carry away the can buoys. Some buoys are fitted with a lamp, which burns day and night; others carry bells which ring when the winds toss the buoy about, and still a third class is fitted with whistles, which are blown by air compressed and driven through them by the tossing waves.

Charts of harbors locate the buoys, and

all navigators understand not only the location of each, but the special information which each buoy can give. For instance, in the harbors of the United States the buoys are painted black on one side and red on the other. As a ship enters the harbor it sails so as to keep the red sides of the buoys on the starboard side of the ship. Danger buoys are painted with red and black horizontal stripes; mid-channel buoys have black and white stripes running vertically; while the buoys that mark danger points are painted green. White buoys indicate safe anchorage.

BURBANK, LUTHER (1849-1926), an American plant breeder of world-wide reputation. For the greater part of his life he specialized in plant improvement and the creation of new forms of trees, fruits and flowers, and he achieved remarkable results. In the article following, the reader will find an account of Burbank's methods and his more striking achievements.

He was born at Lancaster, Mass., received there a common school and academy education, and for a time worked in a factory in Worcester. As a boy he had been intensely interested in everything pertaining to nature, and it was inevitable that he should ultimately abandon factory life and devote himself to raising garden stuff and seeds. His first work in plant breeding was an experiment with potatoes, out of which grew the famous Burbank potato now raised by the millions of bushels. The climate of Massachusetts not proving adapted to the plans he had in mind, he journeyed to California, and in 1875 settled in a valley north of San Francisco. After a disheartening struggle he finally became the prosperous owner of a nursery business, and in 1893 was able to turn all of his energies to experimentation. At Sebastopol he had a great experiment farm, the fame of which is international; Burbank and his family lived eight miles distant, in a beautiful home at Santa Rosa.

Some Important Definitions. While still in his teens Luther Burbank began his experimental studies to improve our useful and ornamental plants. Early he knew that a better plant demanded selection and segregation. *Selection* means guiding the changes in plant life by cutting off all those plants which are changing in undesirable ways, and reserving for reproduction only those which

are better than the average. With these finer specimens the processes of planting and developing are continued. *Segregation* means keeping these more desirable plants away from the poorer specimens, so the latter may not influence the better specimens in their natural processes of reproduction. "Like produces like;" man never will be able entirely to change this man-made definition of Nature's laws, but by intelligent plant breeding we have already modified it to "Like produces like, or nearly like." Burbank did things according to the ways of Nature; he took things as he found them and at the end of many patient years he had yet the same thing, only larger, more beautiful, of greater value and utility, made so

by the simple process of working with Nature.

The chief means by which he arrived at the results he sought consisted in producing new varieties by *crossing*. By crossing is meant a mixing of races or kinds, or a mingling of the characteristics of different organisms. The resulting organism is called a cross, or, more commonly speaking, a *hybrid*. The general reader sees the word *hybrid* very frequently; it is easily understood in any connection in which it may be found if one simply remembers that a hybrid is a crossbred animal or plant—the offspring of the male of one variety or species with the female of another. Another word we must understand at this point is

Raise a Child Like a Rare Plant

In addressing a convention of teachers Luther Burbank summed up admirably the proper care of children, using as illustration plant life, which he knew so thoroughly. He said:

"Raise the child like a plant, care for it as you do for the rarest specimen of vegetation, bring it up in an atmosphere of love.

"If the child has but the smallest trace of some characteristic you desire to develop, take hold of it, care for it, surround it with proper conditions and it will change more certainly and readily than any plant quality," he declared with a fervor which left no room to doubt that from the fulness of his knowledge he knew what he said was true. This possibly is the keynote in the whole system of proper child rearing. Plant life is improved and quality is bettered by careful cultivation of desired characteristics. The same rule applies in training the child.

Mr. Burbank added emphasis in the following lines, which serve to explain his last statement above:

"The child in nature and processes of growth is essentially the same as the plant, only the child has a thousand strings instead of but a few, as has the plant.

"Where one can produce one change for

the betterment of the plant one can produce a thousand changes for the betterment of the child.

"Surround the child with the proper environment to bring out certain qualities and the results must come.

"Work in the same way as I do with the plant, and you will find the development of the individual is practically unlimited.

"I have taken the common daisy and trained it and cultivated it by proper selection and environment until it has been increased in size, beauty and productiveness at least four hundred fold.

"Do our educational methods do as much for our children? If not, where is the weakness?

"Not only would I have the child reared for the first ten years of its life in the open, in close touch with nature, a bare-foot boy with all that implies for physical stamina, but would have him reared in love.

"I have taken the little yellow California poppy and by selecting over and over again the qualities I wished to develop have brought forth an orange poppy, a crimson poppy, a blue poppy. Cannot the same results be accomplished with the human?

"Is not the child as responsive?"

strain. A strain is a group of plants of the same variety which differs from the race to which it belongs, but differs only in improved physiological tendency, and not by any apparent characteristics.

Burbank's aim in crossing plants was to secure the combination of desirable qualities into one strain, and in the process eliminate undesirable characteristics. Many times only one crossing was necessary; in other instances many crosses were needed, during which processes many progeny appear which are valueless and must be destroyed. It is here that one must exercise great care in selection. Crossing is only one of the means of producing better varieties and species. Long continued and patient selection of the plants which nearest approach the quality desired must be continued until such quality is found in some individual plant. Then it is thereafter reproduced from seed, and all future growths which show a tendency to revert to inferior quality must be rigidly excluded until none but the type desired shall remain.

A Few Burbank Creations. The Burbank potato, the first fruit of his work as an investigator, has proved of great commercial value. It is discussed more fully in these volumes under the heading POTATO. In 1880 he began crossing blackberries, and of the various forms he produced none is more interesting than the white blackberry, with delicious pure white fruit (see BLACKBERRY). The seedless apple, the Shasta daisy, the spineless cactus, cobless corn and the stoneless plum are other notable Burbank creations, which the reader will find discussed under the headings APPLE, DAISY, CACTUS, CORN and PLUM. Of interest, too, are the pomato, which resembles a tomato but grows on a potato vine, the Burbank walnut, and the Burbank quince, which tastes like a pineapple. In 1918 he announced the production of a new variety of wheat which can be harvested at the rate of fifty bushels to the acre from the soil that formerly produced twelve bushels.

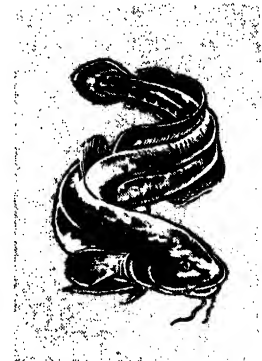
A World Benefactor. The average reader has doubtless considered Luther Burbank to be a theorist, a man lacking in practical lines of endeavor; but the foregoing brief account of his work should fully convince one that he was one of the most practical experimenters in this field of endeavor. It would be utterly impossible to estimate the

added wealth which flows into the pockets of the farmers and fruit growers every year as a result of this patient man's development of our fruits and plants. Had he produced nothing during his whole life time of experiments other than the Burbank potato and the edible cactus, he would deserve an exceedingly high place in the memory of generations to come.

Consider the lowly potato, the drowsy poppy, the succulent plum, and the delicate blackberry; give thought to the cactus, the rose, the lily, all of which he has developed in directions that are marvelous—consider, in brief, almost any plant you choose, and if you follow the investigation carefully enough your study will lead you inevitably to the door of a cottage in Santa Rosa, for years Burbank's California home.

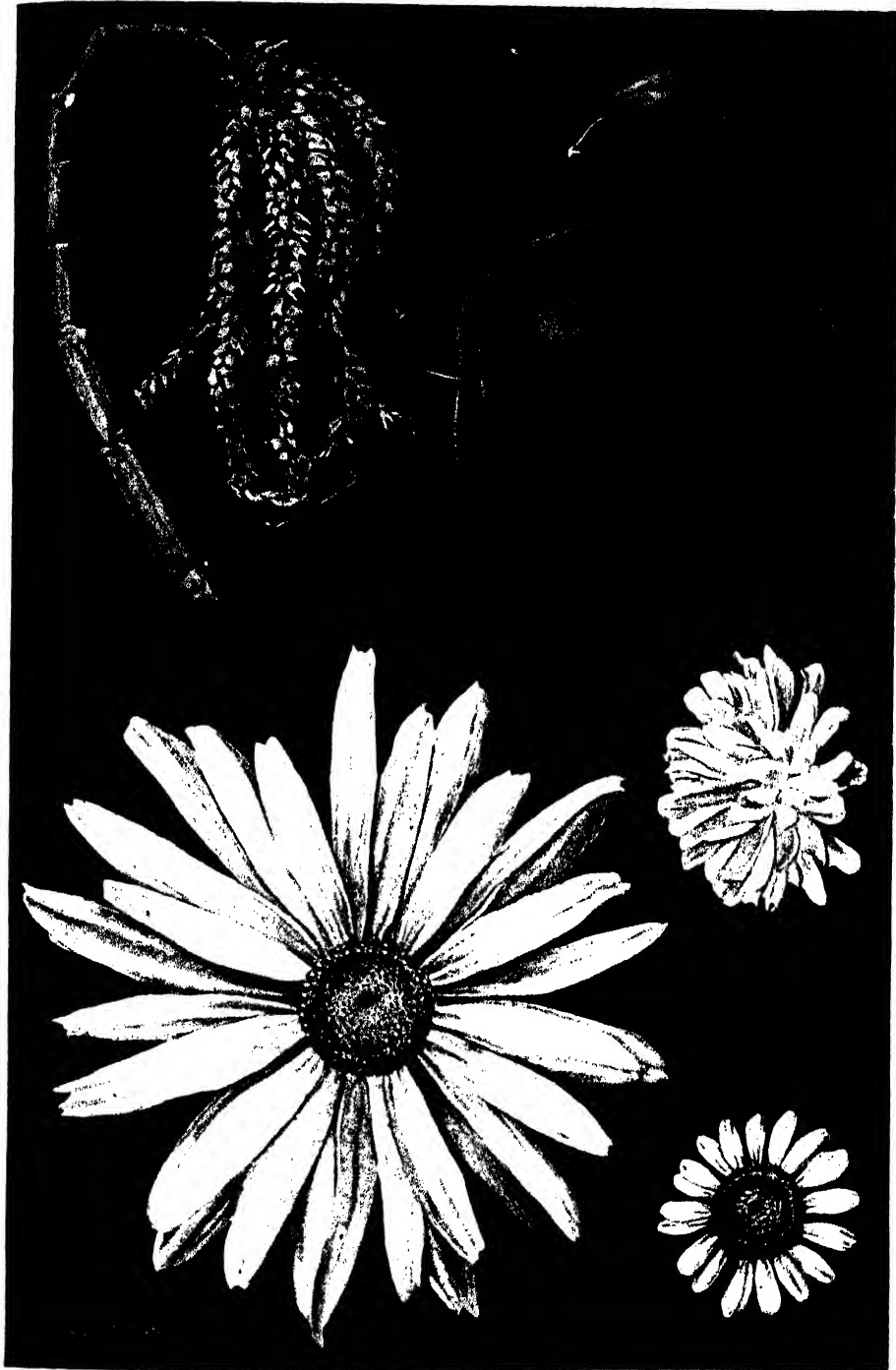
BURBOT, a fish of the cod family, found in the streams of the United States, England, Northern Europe and Asia. It never enters salt waters.

The burbot is shaped somewhat like an eel, but is shorter, and has a flat head, with two small barbs on the nose and another on the chin. It is called also, *eelpout* or *coney-fish*. The *spotted burbot* is found in the American northern lakes and rivers. It is a coarse and tasteless fish, and is not valuable as food.



BURBOT

BURDETTE, *bur det'*, ROBERT JONES (1844-1914), an American clergyman and humorist, born in Greensboro, Pa. He attended public school at Peoria, Ill., and in 1862 joined the Forty-seventh Illinois volunteers, serving through the war. He wrote for several papers after the war and finally became associate editor of the *Hawkeye* of Burlington, Iowa, through which paper he became known as a humorist. He began to lecture in 1877 and ten years later became a licensed preacher in the Baptist Church. Among his books are *The Rise and Fall of the Mustache* and *Other Hawkeyetems and Chimes from a Jester's Bells*.



SOME RESULTS OF LUTHER BURBANK'S EXPERIMENTS

- 1--Cobble corn 2--Wonderful hybrid plum and its tiny parent; both natural size 3--Shasta daisy and its parents, all natural size

BUR'DOCK, a coarse weed with hooked flower heads which cling to animal hair and to the clothing of people. It is a common pest in the United States and Canada in those sections where cows and sheep graze. The burdock sometimes grows to be three feet high. It may be recognized by its large, roundish or heart-shaped leaves and prickly flowers. The plant is a biennial (which see), and cutting down does not destroy it; a more effective method of exterminating it consists in grubbing it up before the plant has a chance to bear seed. The large, thin leaves are sometimes used to make soothing poultices for inflammation, and in Japan the roots, young leaves and young shoots are used in soups.

BUREAU, *bu'ro*, a word of French origin now having two widely different meanings. The term is commonly applied to an article of bedroom furniture having drawers and a mirror, though the term *dresser* is also in general use for the same object.

According to its other meaning *bureau* means a department of government or a division of a department, as the Bureau of Accounts. *Bureau system*, or *bureaucracy*, is a term often applied to those governments in which the business of administration is carried on in departments, each under the control of a chief; or, more broadly, to the system of centralizing the administration of a country through regularly graded series of government officials.

BUREAU OF AMERICAN REPUBLICS.

See PAN-AMERICAN UNION.

BUREAU OF CORPORATIONS. See FEDERAL TRADE COMMISSION.

BUREAU OF EDUCATION. See EDUCATION, OFFICE OF.

BUR'GLARY, the breaking and entering by night into the dwelling house of another, with intent to commit a felony. Every important word in this definition (from Coke) conveys a part of the meaning which distinguishes the offense of burglary from others known as *larceny* and *robbery* in the common law. Various American states and Canadian provinces have changed the definition of the crime by statute, so that it includes more than the above definition. The usual punishment is imprisonment, the maximum being rarely more than twenty years. The killing of a burglar in self-defense or in defense of family or property is not a crime. See FELONY.

BUR'GOMASTER, a German official whose duties are similar to those of the mayor of a town or city in England or America. The office is generally elective, but under the Empire if the government deemed it wise it might refuse to sanction the choice of the electors. This title occurs frequently in stories, plays and operas having a German background. The man who would become a burgomaster in a German city must qualify for the post by years of study.

BURGOYNE, *bur gawyn'*, JOHN (1722-1792, an English general of the Revolutionary War, whose surrender at Saratoga, in 1777, is generally considered the turning point in that struggle. After serving in various parts of the world, he was in 1777 appointed commander of an army against the Americans, and took Ticonderoga. A part of his army fought a battle at Hubbardton, a detachment of Hessians was defeated at Bennington, Vt., and on October 17 Burgoyne himself was forced to surrender with his whole army at Saratoga. He was coldly received on his return to England and deprived of his command. Latterly he occupied himself with the writing of comedies, including the *Maid of the Oaks*, *The Lord of the Manor* and *The Heiress*, a play that still holds the stage.

BUR'GUNDY, a French territory which figured prominently in European history in the Middle Ages. In 933 the northwestern portion became a separate duchy, subject to the French crown and governed by a line of dukes from the House of Capet, which became extinct in 1361. Dating from the accession of Philip the Bold, the territory and power of Burgundy constantly grew and increased in importance. On the death of Charles the Bold in 1477 the duchy was seized by Louis XI, king of France, and annexed to France. The old Burgundy forms the modern departments of Côte-d'Or, Saône-et-Loire and Yonne, part of Ain and part of Aube. The chief towns are Dijon, Auxerre, Chalon-sur-Saône and Macon.

BURGUNDY WINES, wines produced in the former province of Burgundy, especially in the Department of Côte-d'Or. In richness of flavor and all the more delicate qualities of the juice of the grape, they are inferior to none in the world. See WINE.

BURIAL, *ber'e al*, the mode of disposing of the dead. Peoples adopt different methods of burial. The savage races expose the

bodies to wild animals or to birds of prey; the Hindus throw their dead into the Ganges River. However, the two most common methods have been interment and burning. Both forms were practiced among the Greeks and Romans, though burning, or cremation, came to be almost the sole method during the later years of the Republic. The method of interring has varied; in some cases, as with the early Babylonians, the bodies were placed on the surface of the ground and mounds were raised over them, while in other cases deep graves were dug, or elaborate buildings constructed, to contain the urns or coffins in which the bodies were sealed. Among civilized nations of to-day cemeteries are set apart, in which the bodies are buried, as after the introduction of the Christian religion the practice of cremation (which see) almost entirely disappeared. Latterly, however, it has been revived, and it is undoubtedly a more sanitary method, since it is certain that in many cases the hill-side cemetery proves a source of contamination to the water supply of town and city. See CREMATION; EMBALMING.

BURKE, EDMUND (1729-1797), a noted British writer, orator and statesman, who applied himself both to literature and to law, though chiefly the former. In 1756 he published his essay *On the Sublime and Beautiful*, which procured him the friendship of some of the most notable men of his time. The great question of the right of taxing the American colonies was then occupying Parliament, and while Burke was a member for Bristol he made several wonderful speeches in which he criticised the measures of the ministry with regard to the colonies and advocated a policy of justice and conciliation. His speech *On Conciliation with America* is one of the finest examples of argumentative oratory in existence, and is widely studied in high schools as a model of logical writing.

In 1782 Burke was made paymaster-general of the forces, and after the change of Ministry in 1783 he took an active part in the famous impeachment trial of Warren Hastings. The clearness and eloquence of his oratory and his remarkable mastery of detail in the consideration of this case have never been surpassed. In his later struggles to combat the ideas and doctrines of the French Revolution he was separated from the Liberals and his old friend Fox, and

from this time on until his withdrawal from Parliament in 1794 he was a consistent opponent of Revolutionary ideas.

BURLAP, a heavy cloth made from flax, hemp and other fiber plants, which in recent years has become popular interior decoration. Plain and decorated burlap may now be seen in artistic homes, serving as wall coverings, cushion tops, hangings, etc. Originally burlap was considered suitable only as a material for sacks or for packing. The undyed fabric is an ugly shade of tan.

BURLEIGH, *bur'li*, LORD. See CECIL WILLIAM.

BURLESQUE, *burlesk'*, a literary composition which excites laughter by its travesty of some other work or by a ludicrous mixture of things high and low. High thoughts, for instance, are clothed in commonplace language; high sounding words may be used to describe insignificant thoughts or facts. The most famous of the early writers of burlesque in England was Chaucer, who ridiculed some of the bombastic and long drawn-out tales of the Middle Ages. *Don Quixote*, the most famous example of this class of works, was originally intended as a burlesque on the absurdly romantic tales of chivalry. As a form of the drama, burlesque was well known to the Greeks, and it has persisted steadily wherever dramatic forms have been cultivated. The dramas of W. S. Gilbert contain the strain of burlesque in their travesty of fads and affectations, but at present the burlesque means rather a mixture of travesty, vaudeville and ballet. The most modern burlesque, as presented in large cities, sometimes approaches the obscene.

BURLINGAME, ANSON (1820-1870), an American statesman who negotiated, in 1868, the treaty known by his name, between the United States and China, by which the latter first subscribed to the principles of international law. He was graduated in law at Harvard in 1846, began to practice at Boston, became a state senator in 1853, entered Congress in 1854 and remained there until March, 1861. In 1856 he was challenged by Preston S. Brooks, whose brutal assault upon Charles Sumner he had denounced in scathing terms. The duel was never fought. Burlingame was sent in 1861 as United States minister to China, and when he was recalled, in 1867, the Chinese government engaged his services as its diplomatic representative in Europe and America.

BURLINGTON, Iowa, situated on the west bank of the Mississippi River, 206 miles southwest of Chicago, is the county seat of Des Moines County. The river commerce is extensive. It was settled in 1832, named in 1834 for Burlington, Vt., and incorporated as a city in 1837. It is served by the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Toledo, Peoria & Western railroads, and the city has a modern airport. There are three parks, containing eighty-six acres. The shops of the C., B. & Q. Railroad are here, and there are engine works, candy factories, wood-working shops and numerous wholesale houses. The city has a public library, three hospitals and a junior college. The commission form of government is in operation. Population, 1920, 24,057; in 1930, 26,755.

BURLINGTON, N. J., eighteen miles north of Philadelphia, is on the Delaware River and the Pennsylvania Railroad. It is a manufacturing town, and produces structural steel, stoves, shoes, iron pipe, silk, canned goods, carbon paper, and upholstery.

The town is old, having been settled in 1677 by Quakers from London and Yorkshire, under the name New Beverly. Later it was called Bridlington. For several years before 1700 the New Jersey legislature met alternately at Trenton and Burlington. A city charter was secured in 1733, and this was replaced by a new one in 1784. During the Revolution it received the fire of the British on several occasions. The town has a private school for girls. Population, 1920, 9,049; in 1930, 10,844.

BURLINGTON, VT., settled in 1763 and chartered as a city in 1865, is the largest city in the state and county seat of Chittenden County, on the east shore of Lake Champlain, and on the Rutland and Central Vermont railroads. It is at the head of the New York State Barge Canal system. The University of Vermont (see VERMONT, UNIVERSITY OF) and the State Agricultural College are here, and there are two notable libraries. Because it is the state's educational center there are more institutions of learning here than in most cities of like size. The harbor is large, and there is considerable lake commerce. Manufactures are varied, including cotton and woolen goods, mayonnaise, awnings, and maple-sugar utensils. In the vicinity are marble and limestone quarries. Population, 1920, 22,779; in 1930, 24,789.



BURMA, until 1935 was administered as the largest province of British India, but since that year is practically a self-governing unit of the British Empire. It extends northward and eastward from the Bay of Bengal to Assam, Tibet, China and Siam. Its area is about 261,600 square miles, over twice that of the Philippine Islands, and it has a population of more than 14,660,000. The capital is Rangoon, the fifth in population among the cities of British India (400,415). Mandalay, with 144,899 people, is the second city of the commonwealth.

Burma is a hilly or mountainous country, for the most part, with the highest elevation in the north, where a spur of the Himalayas separates the country from Tibet. Chief among several rivers which flow through the mountain valleys is the Irrawaddy, flowing in a southern direction through the central portion. It drains three-fourths of the country, and its wide delta is a region of great fertility. The eastern part of Burma is drained by the Salwin.

Agriculture is the leading industry. The land is leased from the state, the rent constituting an annual tax. The principal products are rice, oil seeds, cotton, tobacco, sugar cane, tea and indigo. Rice is by far the most important product, and Burma is the leading country of the world in its production. Manufactures are few and limited and consist principally of the weaving of silk and cotton textiles. Some of the inhabitants are skilful workers in wood and gold, and their products are of considerable artistic value.

Railways extend from Rangoon to Mandalay, and from Rangoon to Thayetmye and other important towns. The Irrawaddy is navigable, and there are three canals connected with it. Since the British occupation the carriage roads have been greatly improved. The commerce consists of the exportation of rice and other agricultural products, and the importation of textiles, metals and other manufactured products. A considerable part of the foreign trade is with Great Britain and China.

In 1935 a new scheme of government for Burma was proclaimed by the British Parliament. The plan vests executive power in the governor, who will also be commander in chief, and himself administer defense, external and ecclesiastical affairs and matters relating to frontier areas. A house of representatives of 132 elected members and a senate of 32 members is provided; half of the latter are elected by the house and half named by the governor. The larger portion of the inhabitants are Buddhists. The remainder are divided among Mohammedans, spirit worshipers and Christians. Most of the inhabitants are native Burmese and belong to the Mongolian race. The eastern highlands are inhabited by the Shans, and the hills to the north by the Karens. The Burmese language is spoken.

BURNÉ-JONES, EDWARD, Sir (1833-1898), an English painter, one of the associates of Rossetti in the group known as the Pre-Raphaelites, who favored a return to the sincerity and purity of art that existed before the time of Raphael. He painted in water color as well as oil, and his works are remarkable for richness of coloring as well as for poetic feeling. His subjects are from many sources—from the Bible, from Christian and heathen story and from the legends of King Arthur. Among his best known works are *Hope*, *Venus's Mirror*, *The Golden Stair* and *Wine of Circe*. Burné-Jones was made a baronet in 1894.

BURNET, the popular name of two plants of the rose family. Both are common in Europe, where they are cultivated on dry soils as fodder plants. The smaller plant has been introduced into America, and now grows wild in Northeastern United States and Canada. It bears reddish-green flowers arranged in closely packed heads. The leaves are slightly astringent and are sometimes used in soups and salads as flavoring.

BURNETT, FRANCES ELIZA HODGSON (1849-1924), an American writer, widely known as the author of many interesting and well-written novels and of one of the most popular children's stories ever published. The latter—*Little Lord Fauntleroy*—started a new style in boys' clothing, and in dramatized form it was for years a favorite among children's plays. Mrs. Burnett was English-born, but during most of her literary career

she resided in the United States. In 1873 she married Dr. L. M. Burnett, and though she was divorced from him in 1898 she continued to use his name professionally. Her second husband, Stephen Townsend, who collaborated with her in some dramatic writing, died in 1914.

Mrs. Burnett first won an assured place in literature in 1877 with the publication of *That Lass o' Lowrie's*, a stirring tale of English mining life. She wrote industriously thereafter, producing, among other stories, *Haworth's*, *Louisiana*, *A Fair Barbarian*, *Little Lord Fauntleroy*, *Editha's Burglar*, *A Lady of Quality*, *Sara Crewe* (a child's story), *The Pretty Sister of José*, *A Little Princess*, *The Shuttle* (all three dramatized for the moving picture stage), *The Dawn of Tomorrow*, *T. Tembarom* and *The Lost Prince* (1915). The stage version of *The Dawn of Tomorrow* was one of the great popular successes of the day, and the rôle of Glad, played by Eleanor Robson, gave that gifted actress one of the best opportunities of her career. *Little Lord Fauntleroy* was made into a popular moving picture in the days of the silent films, with Mary Pickford in the title rôle.

BURNHAM, *burn'am*, DANIEL HUDSON (1846-1912), an American building designer who first became widely known through his work as architect for the World's Fair at Chicago (1893). He was also famed as the designer of the Masonic Temple, Chicago's first skyscraper, the Marshall Field retail store, then the largest merchandising building in the world, and the Railway Exchange, the foregoing all in Chicago; the Pennsylvania Railroad station in Pittsburgh, New York's famous "Flatiron" Building (the Fuller Building) in New York, Washington's Union Station, other notable structures in Cleveland, Boston, and San Francisco, and the Selfridge store in London, a notable addition to the architecture of that city. Burnham was born in Henderson, N. Y., and was educated in Chicago and in Massachusetts. In 1872, the year after the great Chicago fire, he established a business in the ruined city, and he had a prominent part in its rebuilding. Years later he designed the "Chicago Plan" for making that city one of the finest in the world, but died before he saw more than a mere beginning of his plans. Burnham was a member of the committee for the beautifying of Washington, D. C. (which see).

BURNHAM, SHERBURNE WESLEY (1838-1921), an American astronomer who was remarkably successful in discovering and cataloguing double stars. He was born at Thetford, Vt., and was educated in Thetford Academy. He began life as a stenographer, and while practicing stenography he took up the study of astronomy as a recreation and became deeply interested in it. He soon acquired remarkable skill for an amateur, and in 1876 he became connected with the Chicago Observatory. From this position he went to the Lick Observatory, and on the opening of the Yerkes Observatory he was appointed professor of practical astronomy in the University of Chicago.

BURNING GLASS, a lens having both surfaces curved outward, so that it is thick in the center and thin at the edges (see **LENS**). When the sun's rays pass through such a lens, they are all brought to a point called the focus. The heat at the focus is sufficient to set on fire wood, paper and similar substances. For an interesting story, see **ARCHIMEDES**.

BURN'LEY, ENGLAND, a city on the River Brun, at its junction with the Calder, twenty-nine miles north of Manchester. The place has well-planned streets and excellent buildings, most of which are constructed of stone. The important structures are the townhall, an exchange, a market hall and several churches. The city also has a mechanics' institute, a technical school, a grammar school, numerous public schools and Victoria Hospital. The leading manufactures are cotton and worsted goods and foundry products, and there are machine shops, collieries and quarries in the vicinity. The public utilities are owned by the city. Population, 98,259 (1931).

BURNS, JOHN (1858-), a British labor leader and advocate of Socialistic doctrines. He was born of poor parents, and became a laboring man. In his youth he read extensively along radical lines, and by the time he was twenty he was well known in laboring circles. Several times he was arrested for speeches that were said to be provocative of violence; it is an interesting fact that on one occasion he was defended by a young lawyer named Asquith, who later became Prime Minister. In 1889, while he was an employe in the Hoe press shop, Burns was elected to the London County Council, and three years later he was sent

to Parliament as a member for Battersea. His constituents have since then retained him as their representative. In the Cabinets of Campbell-Bannerman and Asquith, Burns held the position of President of the Local Government Board, being the first Socialist to hold a seat in the British Cabinet. In 1914 he was President of the Board of Trade, but resigned this position on the outbreak of the World War, because he opposed England's taking part in it.



His birthplace

BURNS, ROBERT (1759-1796), the chief lyric poet of Scotland, whose poems are read and loved in many lands. As Tennyson and Browning are poets of the educated classes, so Burns is the spokesman of the man of the soil—"the peasant's poet."

"Bobbie Burns," as the Scotch call him, was born near Ayr, January 25, 1759. His father, a

gardener, and latterly a small farmer, was very poor, but did the best he could to educate his children. Robert was instructed in the ordinary branches by a teacher engaged by his father and a few neighbors. To these common branches he afterward added French and a little mathematics, but most of this education was obtained from general reading, to which he devoted himself earnestly. In this manner he learned what the best English poets might teach him and cultivated the instinct for poetry which was a part of his nature. At an early age he had to assist in the labors of the farm; and when only fifteen years old he had to do the work of a man. In 1781 he went to learn the business of flax dresser at Irvine, but the premises were destroyed by fire, and he was forced to give up the scheme. His father died in 1784, and Robert took a small farm, Mossgiel, which he worked with his younger brother, Gilbert. He began to write poems which attracted the notice of his neighbors and gained him considerable reputation with literary men. This is not strange when we consider that such poems as *The Cotter's Saturday Night*, *To a Mouse* and *The Jolly Beggars* were produced at this time.

An unhappy love affair with Jean Armour of Mossgiel made him decide to emigrate to

Jamaica. To obtain the funds necessary for the voyage, he published by subscription a volume of his poems, in 1786, but as he was about to set sail from his native land, he was drawn to Edinburgh by a letter from an eminent man there, recommending that he should take advantage of the general admiration his poems had excited and publish a new edition of them. This advice was eagerly adopted, and the books sold far better than he had dared to hope. After remaining more than a year in Edinburgh, admired, flattered, and received in the highest society, Burns retired to the country with about \$2,500, which he had realized by the second publication of his poems. A part of this sum he advanced to his brother, and with the remainder he took a farm at Ellisland, near Dumfries. In 1788 he was appointed to the office of exciseman, and his duties were conscientiously performed. He married Jean Armour in 1788. It was during his residence on this farm that he wrote, in a single day, *Tam O'Shanter*.



ROBERT BURNS

The farming at Ellisland was not successful, and in about three years Burns removed to Dumfries and relied on his employment as an exciseman alone. He continued to write, however, and composed a number of beautiful songs adapted to old Scottish tunes. But his residence in Dumfries, and the society of the idle and the dissipated who gathered around him there, attracted by his brilliant wit, had an evil effect upon Burns, whom disappointment and misfortunes were now making somewhat reckless. In the winter of 1795 his health, strained by cares and dissipations, began to give way; and in the following summer he died. He left a wife and four children, for whose support his friends and admirers raised a subscription.

Burns was an honest, proud, friendly, warm-hearted man, combining sound understanding and a vigorous imagination with the high passions which were his misery and ruin. His poetry, at its best, when written in the Scottish dialect rather than in formal English, is marked by a tenderness, a simplicity, and a close touch with life, which give him rank among the greatest poets.

BURNS AND SCALDS are injuries produced by excessive heat on the human body. *Scalds* is a special name for burns caused by moist heat. A minor burn causing reddening of the skin is said to be first degree. When large blisters are formed, the injury is a second-degree burn. Third-degree burns, which are further classified according to the amount of area affected and the underlying tissues involved, are those causing destruction of the entire skin layer. Shock is often present, and when large areas of skin are destroyed, the kidneys and intestines may become infected, since the skin can no longer act as an excretory organ.

In treating first-degree burns the immediate need is to relieve pain. Cold water will lessen the worst of the sting, and then applications may be made of soda and water, lard, thick cream, honey, olive or castor oil, carbonated petrolatum or any similar substance provided it is clean. In second and third degree burns there is always danger of infection. If large blisters form, they should be pricked with a needle which has been made sterile in a flame. The wound should be protected from air and germs by a sterile gauze bandage to which the salve or ointment has first been applied. Pieric-acid gauze, which comes in sealed packages, is excellent for the purpose. The bandage should be securely applied and kept moist with clean water until the doctor arrives. Acid burns should first be washed with water and then saturated with a solution of bicarbonate of sodium. For alkali burns, an effective treatment is the use of weak vinegar or lemon juice.

BURNSIDE, AMBROSE EVERETT (1824-1881), an American military leader who bore a prominent part in the Civil War. He was born at Liberty, Ind., on May 23, 1824, of Scottish ancestry. He was graduated from the military academy at West Point in 1847 and went to Mexico as second-lieutenant of Third Artillery. At the beginning of the Civil War he took command of a regiment from Rhode Island, and in 1862, as commander of the Department of North Carolina, he captured the Confederate garrison on Roanoke Island. He was then transferred to the Army of the Potomac, with the rank of major general. His force held, with great loss of life, the stone bridge at Antietam, which was the important post of the battle, and when, after that battle, General McClellan was relieved, Burnside took the command.

After the disastrous Battle of Fredericksburg he was superseded by Hooker and transferred to the Department of the Ohio. During 1864 and 1865 he served under Grant and took part in all the important battles. After the war he was governor of Rhode Island from 1866 to 1869, and from 1875 to his death was in the United States Senate.

BURR, AARON (1756-1836), an American statesman who figured in a sensational plot against his country during its early history. He was born at Newark, N. J. Burr was a graduate of Princeton College, of which his father and grandfather (Jonathan Edwards) had been presidents. In 1775 he joined the patriot army, where he gained a high reputation, rising to the rank of lieutenant-colonel. Retiring in 1779, he was admitted to the bar, soon became a leader in his profession, was elected attorney-general of New York and in 1791 United States Senator.

In 1800 he was a candidate for President of the United States, and received the same number of electoral votes as Jefferson, but the House of Representatives, chiefly through the influence of Hamilton, elected Jefferson, and Burr became Vice-President. This disappointment, and a subsequent defeat in a contest for the governorship of New York, which he also attributed to Hamilton's influence, with good reason, led him to force a duel upon his great rival. The meeting took place at Weehawken, not far from New York City, July 11, 1804. At the signal, Hamilton fired into the air, but he fell mortally wounded at Burr's first shot.

Burr, branded a murderer by the people, fled to South Carolina, and though indicted for murder, returned after the excitement had subsided and completed his term as Vice-President. But his political prospects in the United States were destroyed, and he therefore prepared to raise a force to conquer Texas, establish there a republic, with himself at its head, which might detach the Western states from the Union and give him vengeance for past injuries and failures. His scheme had progressed to an advanced stage, when the enterprise was detected, and Burr was tried for treason (1807). Though acquitted, his reputation was ruined. He spent some wretched years in Europe, and in 1812 returned to his law practice in New York. Here, shunned by society, he died on Staten Island.

BURROUGHS, bur'roze, JOHN (1837-1921), an American naturalist and essayist, born on a farm near Roxbury, N. Y. He attended a country school, and as a young man studied at seminaries in Ashland and Cooperstown during intermissions of teaching. Meanwhile a growing enthusiasm for birds and flowers inspired him to try his hand at recording his impressions in writing. The result was a series of excellent nature essays that were published in book form under the title *From the Back Country*. Unable, however, to support himself by writing, he took a position in the Treasury Department at Washington, and remained there from 1863 to 1873. A valued friendship with Walt Whitman and growing recognition of his talents as a writer of delightful prose were compensations for an uncongenial task. In 1873 Burroughs bought a farm on the Upper Hudson and thereafter devoted himself to his chosen field. An easy, natural style and a genuine gift for accurate observation made him one of the most widely read American essayists of his time. He, more than any other writer, established the vogue of the nature essay.

Locusts and Wild Honey, Pepacton, Wake Robin, Sharp Eyes, Far and Near and *The Ways of Nature* are books of essays on rural subjects, while *Whitman: a Study, Literary Values* and *The Light of Day* show his interest in general literature. Many of his papers were written at *Slabsides*, the rustic house which he built for himself on his little celery farm at Esopus, about a mile from the Hudson River. In 1903 Burroughs traveled through the western part of the United States with Theodore Roosevelt; *Camping and Tramping with Roosevelt* contains an account of these travels. Among other works are *Leaf and Tendril*, a volume of essays; *Bird and Bough*, a volume of poems; *Time and Change, The Summit of the Years* and *The Breath of Life*.

BURYING BEETLE, the name of a genus of common insects that have a very keen sense of smell, which guides them to small dead animals, around and under which they burrow until the bodies are covered by the ground, sometimes to a depth of six inches. In these carcasses the beetles lay their eggs, and the young larvae, which hatch in less than a fortnight, find plenty of food awaiting them. There are ten distinct American species.

BUSHEL, a measure of capacity in the English system of weights and measures, used chiefly for measuring dry quantities. The standard bushel in Canada and the United States contains 2,150.42 cubic inches, being equal to a cylinder 8 inches deep and 18½ inches in diameter, interior measure. It is about equivalent to 35.24 liters. In Great Britain an *imperial bushel* is also used, having a capacity of 2,218.192 cubic inches. A bushel is divided into 4 pecks, each peck into 8 quarts, each quart into 2 pints, each pint into 4 gills. It is also sometimes divided into 8 dry gallons.

BUSH'MEN, a race of people who dwell in the western part of South Africa, in the immense plains bordering on the north side of the Cape of Good Hope. They are among the most degraded races of the world. They unite only for defense or pillage, have no established homes and do not cultivate the land, but support themselves by hunting. Their language is exceedingly primitive, consisting only of a certain clicking with the tongue and harsh, gurgling tones, for which we have no representation. They are now under the control of the British government.

BUSINESS COLLEGE, a school devoted to training young men and women in commercial work. Such schools are the response to a demand for practical training in business such as public schools did not attempt to furnish until within recent years. Even to-day only the larger cities have public-school courses in business subjects. The courses of the best colleges now include instruction in commercial arithmetic, a thorough system of accounts, including banking and commission, shorthand and typewriting, commercial law and at least one modern language.

The business colleges in the United States are presumed to be the outgrowth of the work of Mr. R. M. Bartlett of Cincinnati, who in 1846 began to give instruction in bookkeeping and other commercial subjects to private pupils. By 1860 all leading cities of the country contained one or more business colleges, and since that time their number has greatly increased. There are now few cities of 5,000 people that do not have one or more schools of this class. For a number of years these schools possessed no special text-books, but as they increased in number and patronage special texts were provided. The development in all lines of

industry has made it necessary for the business colleges to extend their courses of study and provide instruction in a large number of branches.

BUST, in sculpture, a representation of the head and upper part of the body. This form of sculpture was practiced by the Greeks as early as the sixth century B. C. It is shown in the *Hermae*, heads of *Hermes* mounted on pillars and erected along the roads to serve as guideposts. During the literary period of Greece, portrait busts came to be an important form of sculpture, and there remain to us to-day faithful likenesses of such men as Socrates, Demosthenes, Plato and many others. There have also been preserved a large number of Roman busts. After an interval of several centuries, bust portraiture was revived late in the Middle Ages, and has continued to be an important field for the sculptor.

BUS'TARD, a game bird, of which there are several species found in Europe and Africa. The head is flat, the neck thick, and the bill somewhat blunt and depressed. This bird is now rare in Britain, but it is found in the southern and eastern parts of Europe and on the steppes of Tartary. The largest species weighs twenty-five or thirty pounds. Bustards can all run very rapidly, but they take flight with difficulty. Their food consists chiefly of juicy plants, though they eat earthworms and insects.

BUTCHER BIRD. See **SHRIKE**.

BUTLER, BENJAMIN F. (1818-1893), an American lawyer, politician and general, born at Deerfield, N. H., and educated in Maine. After practicing law successfully in Lowell, Mass., he was elected to the state legislature, where he was aggressive in behalf of labor reforms. Soon after the outbreak of the Civil War, Butler was made major-general of volunteers, and in 1862 he took command of an expedition to New Orleans. From May until December he was in charge of the city, and his arbitrary conduct made him so generally hated that President Davis proclaimed him an outlaw. He subsequently served in Virginia and North Carolina with little success, and in 1864 returned to political life. Butler sat in Congress as a Republican from 1867 to 1879, except for one term; he was elected governor of Massachusetts as a Democrat in 1882, and in 1884 was the Greenback-Labor candidate for President.

BUTLER, ELLIS PARKER (1869—), an American humorist, born in Muscatine, Iowa. In his youth, while working in a grocery store, he wrote verse and short stories at night, and had them published in *Life*, *Judge* and other humorous magazines. The laughable *Pigs Is Pigs*, written in 1906, is still his most famous narrative, though followed by an endless stream of short stories and sketches. Original wit, homely philosophy and an easy, familiar style have given Butler a wide reading public. His stories are published under such book titles as *The Incubator Baby*, *Red Head*, *The Behind Legs of the 'Orse* and *Pigs, Pets and Pies*.

BUTLER, NICHOLAS MURRAY (1862—), an American educator, born in Elizabeth, New Jersey. He was educated at Columbia College and after graduation took special courses in Berlin and Paris. Following his studies abroad, he was appointed assistant in philosophy at Columbia. He founded and was the first president of the New York College for the training of teachers, an institution which is now the Teachers' College of Columbia University. In 1902 he succeeded Seth Low as president of the university, and subsequently became head of three constituent colleges—in 1904, of the College of Pharmacy; in 1928, of Barnard College (for women); in 1931, of the Post-Graduate Medical School. He is an advocate of liberal education, as opposed to emphasis on vocational training. See COLUMBIA UNIVERSITY.

Dr. Butler is identified with the Republican party, but opposed the party's espousal of prohibition. He received the Republican electoral vote for Vice-President in 1913, James S. Sherman, the original nominee, having died. Public matters of national and international interest engage his voice and pen. For his efforts in behalf of international co-operation, he shared the Nobel prize for peace with Jane Addams in 1931. Dr. Butler's numerous books include *The Meaning of Education*, *Building the American Nation*, and *Between Two Worlds*.

BUTLER, PIERCE (1866—), an American lawyer, born in Dakota County, Minnesota. He graduated from Carleton College in 1887. He practiced law in St. Paul, and in 1913 became Counsel of the Commission on the Federal Valuation of Railroads. In 1922 he was appointed by President Harding as Associate Justice of the Supreme Court.

BUTLER, PA., founded in 1798 and incorporated in 1803, is the county seat of Butler County, and is located thirty-one miles north of Pittsburgh. It has three railroads—the Bessemer & Lake Erie, the Pennsylvania and the Baltimore & Ohio. The industries center largely in coal, iron, oil and gas; important products are steel cars, plate glass, oil-well supplies, gas and steam engines, cement, shirts and overalls. Industries not so extensive are manufactories of silk, pearl buttons, auto chains, and white lead. There is a public library, a hospital and a courthouse. Population, 1930, 23,568.

BUTLER UNIVERSITY, a coeducational institution at Indianapolis, Ind., chartered in 1849 as the Northwestern Christian University by the Disciples of Christ. For some years it was known as Butler College. There are a college of liberal arts, schools of music and art and a theological course. Attendance, 1,500.

BUTTE, *bute*, an isolated hill or mountain rising abruptly above the surrounding country. Buttes abound in the Rocky Mountain region; many of them have been formed by the erosion of ancient plateaus, and they are prominent features in the landscape. The situation of the largest city in Montana in a region of this nature gave the place its name of Butte. The term is also applied to high mountains, though it is not generally so used in the United States. See PLATEAU.

BUTTE, *bute*, MONT., founded in 1864 and named for Big Butte (see BUTTE), west of the city, is the county seat of Silver Bow County and the metropolis of the state. It is seventy-two miles southwest of Helena and twenty-five miles southeast of Anaconda. Four railroads—the Northern Pacific, the Chicago, Milwaukee, Saint Paul & Pacific, the Great Northern, and the Union Pacific—serve the city's needs. Mining interests are dominant; copper is the most important product of the labor of 12,000 miners locally employed. There are 150 mines in the vicinity in active operation; underground workings total 2,700 miles. The vicinity produces a million pounds of copper per day. Besides copper, there is found gold, silver, lead and zinc. Over \$1,000,000 a week results from mining, and the monthly mining payroll is \$2,000,000. There are a number of large commercial buildings, a library, three hospitals and the important Montana School of Mines. Population, 1930, 39,532.



BUTTER, a very essential dairy food, made from the fat of milk. It was formerly derived from the milk of goats and sheep, but cow's milk is the source of practically all butter found on the market to-day.

How Made. In England and some other countries butter is occasionally made by churning the new milk, but it is usually obtained by churning the cream. The first step in the process is separating the cream

from the milk. This is done by setting the milk in a cool place in shallow dishes, by placing it in deep cans which are immersed in cold water, or by the cream separator. In large modern dairies the separator process has replaced the other methods, as it saves time and secures a larger proportion of the cream. The cream may be churned while it is sweet or it may be allowed to stand until it becomes slightly sour, or ripens. The ripened cream is usually preferred, since it gives butter of a better flavor. Artificial "starters" made of sour skim milk or prepared ferments are sometimes used, as they protect the ripening cream from undesirable germs that are liable to appear in cream left to ripen. While being churned the cream should be kept at a temperature of from 50° to 65° F.

Churning simply gathers the particles of fat together and separates them from the buttermilk. After the churning, the buttermilk is drawn off, the butter is washed and then worked, for the purpose of expelling any remaining milk or water that it may contain, and for absorbing the necessary quantity of salt. The working is done either by hand or in a machine called the butter worker. In creameries churning and butter working are all done by machinery. In home dairies they are usually performed by hand labor.

Qualities and Composition. The natural color of butter is golden-yellow, but a darker color does not necessarily indicate an inferior quality. Butter made in the spring and early summer, when the cows have fresh grass to graze upon, is generally darker than

that made later in the year. Artificial coloring matter is sometimes used to insure uniformity of color; the dyes employed most commonly are annatto, turmeric, saffron, marigold leaves and carrot juice. A good butter has a distinctive flavor, is free from disagreeable odors, is firm, and can be spread readily. A greasy feel or oily taste is not desirable. In America an ounce of salt is ordinarily used for one pound of butter, but European butters as a rule have a smaller proportion of salt.

A Test for Purity. Butter ranks high in nutriment, since standard qualities contain eighty-three per cent of fat or more. In the United States butter having a fat percentage below 82.5 and a water percentage greater than 16 is considered below standard. Pure butter is recommended as a part of a well-balanced ration. Care should be taken to serve only a pure product; there is a simple test by which any housewife can discover whether or not she has been sold a butter free from artificial fats. Melt a bit of the butter to be tested in warm (not hot) water. Keep it at an even temperature for half an hour. If pure it will show clear at the end of that time; if it contains artificial fat it will be cloudy. Also, if a little pure butter be heated in a spoon over a flame it will simmer quietly. If butter sputters and pops under such a test it has artificial fats in it. Oleomargarine (which see) is a butter substitute.

Production. In proportion to its size, Denmark leads the other countries of the world in butter output; the output of that little country is a fourth as great as that of the United States, the world's largest producer. In the United States, Minnesota leads, with about 265,000,000 pounds a year; Iowa and Wisconsin produce nearly equal amounts, nearly a hundred million pounds below Minnesota. Other states which produce more than 50,000,000 pounds are Nebraska, Ohio, California, Michigan, Missouri, Illinois, and Indiana, usually, though not always, in the order named.

Related Articles. Consult the following titles for additional information:

Cattle	Cream Separator	Dairying
Churn	Oleomargarine	Milk

BUTTERCUP, or **CROWFOOT**, an attractive roadside flower of a bright yellow color, common in England and America. The plant grows from a foot and one-half to over two feet in height, and bears notched, three-parted leaves. The flowers have five

smooth petals that curve in a manner that suggests a butter cup. To the farmer this charming plant is a troublesome weed. It belongs to a family known also as buttercup. For illustrations of members of this family, see BOTANY.



BUTTERFLY, the most beautiful insect known, of universal interest because of its brilliantly-colored wings, graceful flight and wonderful life history. That the gaily colored butterfly is the outgrowth of a repulsive hairy worm is one of the most fascinating miracles of nature. Among the other classes of insects there is one group which bears a close resemblance to the butterflies, and that one is the moth group. It is important

to know that they differ in several important particulars. The antennae, or feelers, of butterflies are club-shaped, while those of moths are threadlike or of feather-form. When at rest butterflies hold their wings in a vertical position, while those of the moth remain flat. Butterflies fly by day, while with few exceptions moths fly at twilight or during the night. The butterflies, too, usually have more slender and more brightly colored bodies than the moths.

Parts of a Butterfly. The body of the butterfly has three parts: head, thorax and abdomen. The conspicuous parts of the head are the two antennae, the eye clusters, or ocelli, and the tongue, which, when not in use, is coiled like the spring of a watch. Between the ocelli is a sucking apparatus, by means of which the insect draws its food up through the long tube constituting the tongue. The butterfly has six legs and four wings, all of which are attached to the thorax. The legs are weak and are used only when the insect is resting or feeding.

The wings are large and strong; the first pair is usually triangular, the second pair, rounded. In some families, such as the swallow tails, the second pair of wings has long narrow or pointed extensions. The wings consist of membranes supported on a framework of tubes, which serve the double purpose of veins and air tubes. These tubes

are double, one within the other. The air circulates through the outer and the blood through the inner. The membrane of the wings and the body of the butterfly are covered with minute scales, arranged like the scales on a fish or the shingles on a house. These scales, when viewed under a microscope, resemble feathers. They are highly colored and have a perfect structure. It is to them that the butterfly owes its brilliancy and beauty. When a butterfly is caught by the wings, the scales rub off like a fine dust. Their removal from the wings impairs the flight of the insect, or prevents it altogether.

Classification. Butterflies and moths constitute the insect order Lepidoptera, or scaly-winged insects (see INSECTS). The butterflies of North America are classed under the following families:

1. "Brush-footed" Butterflies (Nymphalidae).
2. "Metal Marks" (Lemonidae).
3. "Blues," "Coppers" and "Hair-streaks" (Lycaenidae).
4. "Swallowtails" (Papilionidae).
5. "Skippers" (Hesperiidae).

These five families include all the 650 or more species of butterflies found within the United States. About 50,000 species are known in the world.

The first and fourth of these families contain the most conspicuous and best known butterflies. Most of the specimens are large and characterized by brilliant coloring. The swallowtails and the diana are conspicuous species. A comparison of the species inhabiting tropical and semi-tropical climates with those of temperate latitudes shows that the former have more brilliant colors. The largest species of the tropics are the most gorgeous of insect creations. Their expanse of wing is often eight or more inches, and their coloring is more brilliant than that of the richest tropical flowers.

The habitats of the other species, common in the Southern states, are as follows: The *White Skirted Calico* is a native of Texas; the *Cloudless Sulphur* is common from New England and the Great Lakes to the extreme southern points of South America; the *Great Purple Hair-streak* is common in Central America, Mexico and the Gulf States, and the *Mimic* is a native of Florida and the West Indies.

Life History. Butterflies undergo a complete transformation, or metamorphosis; to

complete their life histories they live in four forms: the egg; the larva, or caterpillar; the pupa, or chrysalis, and the imago, or perfect insect.

The eggs are deposited either singly or in clusters on or near the plant upon which the larva feeds. Each fertilized egg contains the germ of the larva and a fluid upon which this germ is nourished during the period of incubation. This period varies with the species, the locality and the season. In warm countries, and during the summer months, in temperate latitudes, the period of incubation does not usually exceed three weeks, while it may be less. But in cold climates the period is much longer, and in temperate climates the eggs deposited in the fall do not hatch until spring.

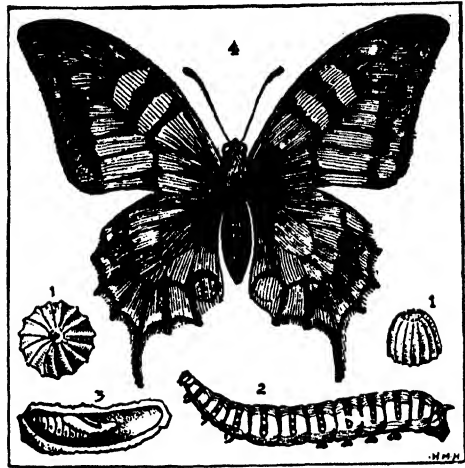
The larva, or caterpillar, is the second stage in the development of the butterfly. The work of the caterpillar is to eat and grow, and it applies itself industriously to its task (see CATERPILLAR). The duration of the larva stage varies with the locality, the season and the species. In temperate climates the larva stage lasts from three to four months, while in the cold regions, where the winters are severe, the period is often ten months. When the second stage is completed, the caterpillar is transformed into a pupa or chrysalis. While the caterpillars of moths generally spin cocoons of silk in which the pupa is enclosed, those of butterflies form a chrysalis having a hard, smooth outer case. The caterpillars of many species attach themselves by buttons of silk to the under side of leaves and change into naked chrysalides hanging head downward.

In other species the chrysalis is attached at one end and also suspended by a silk cord attached to the branch a little more than half the distance between the first point of suspension and the other end of the chrysalis. Chrysalides thus suspended usually take a nearly horizontal position. With few exceptions chrysalides are of a dull color, resembling the object to which they are attached. In the pupa state the insect is to all appearances lifeless, yet it breathes through small pores, and the mysterious life processes of transformation are slowly operative. Many butterflies remain in the chrysalis only a few weeks, while some continue through the winter, or, in tropical climates, during the dry season, before the transformation is completed. When the imago,

or perfect insect, emerges from the chrysalis, it retains some resemblances to the caterpillar, but in from two to four hours its form becomes perfect and it is ready for flight.

Butterflies feed chiefly on the nectar of flowers. In most species, life in the perfect state lasts but a few days; as soon as the eggs for the next brood are deposited, the insect dies. The male and female of the same species usually differ in color, and frequently in size, and are often taken for different species.

Suggestions for Study. To study the life history of a butterfly we should properly begin with the egg. Unfortunately the pupils may not always be able to find eggs; in that case, they may begin with the second, or caterpillar stage. Teachers and parents will find that the children will take a lively interest in the development of the caterpillar. A



LIFE HISTORY OF A BUTTERFLY

1. Eggs, highly magnified. 2. Caterpillar.
3. Chrysalis. 4. Butterfly.

caterpillar may be kept in a glass case, set in a sunny place; if he is fed and given a twig and leaves to build a cocoon, the class may soon see him spin himself into his retreat and finally emerge a perfect butterfly. Let the children keep a record of daily observations of any changes they may notice. Not only will they be interested in the caterpillar, but they will, unknown to themselves, be learning how to observe carefully and systematically. Incidentally the teacher will find many opportunities to teach the lesson of kindness to animals.

Outline on The Butterfly

I. GENERAL DESCRIPTION

- (1) Insect
 - (a) Different from moth
 - (1) Shape of antennae
 - (2) Position of wings at rest
 - (3) Time of day when it flies
- (2) Anatomy
 - (a) Head
 - (1) Antennae
 - (2) Eyes
 - (3) Tongue
 - (b) Thorax
 - (1) Legs
 - (a) Number
 - (b) Structure
 - (2) Wings
 - (a) Number
 - (b) Structure
 - (c) Abdomen
- (3) Color, size and form
 - (a) Variations
 - (1) Due to sex
 - (2) Due to climate
- (4) Habits
 - (a) Feeding
 - (b) Hibernation
 - (c) Migration

II. CLASSIFICATION

- (1) North America
 - (a) Brush-footed
 - (b) Metal marks
 - (c) Blues, coppers and hair-streaks
 - (d) Swallowtails
 - (e) Skippers
- (2) Arctic Regions
- (3) Temperate zones
- (4) Tropics

III. LIFE HISTORY

- (1) Eggs
 - (a) Where deposited
 - (b) Number
 - (c) Time required for hatching varies
 - (1) According to species
 - (2) Locality
 - (3) Season
- (2) Caterpillar or Larva

- (a) Definition
- (b) Duration of this stage
- (c) Anatomy
 - (1) Head
 - (a) Antennae
 - (b) Eyes
 - (c) Mouth
 - (2) Body
 - (3) Organs
 - (d) Food
 - (e) Method of self-defense
 - (f) Molting
- (3) Chrysalis or pupa
 - (a) Apparently lifeless
 - (b) Protected
 - (1) By cocoon
 - (2) By chrysalis
 - (c) Duration of the stage
- (4) Butterfly or imago

Questions on the Butterfly

To what great division of animals does the butterfly belong?

In what respects is the butterfly different from the moth?

What are the three parts of the butterfly's body?

What are the antennae? Ocelli?

What is the position of the tongue when not in use?

To what part of the body are the legs and wings attached?

How many legs has a butterfly? How many wings?

What is the structure of the wing? What are the usual shapes?

To what is the brilliant coloring of the wings and body due?

On what do butterflies feed? How is this food obtained?

What are the principal causes of variations in color and size?

Where are the largest varieties found? How large are they?

Name the five principal classes of butterflies found in North America.

Where are the eggs deposited?

How long is the period of incubation? Is it uniform in all climates and in all seasons?

The illustrations in this article should be of value to all who study the butterfly; the four states in the life of the swallowtail, one of the commonest North American butterflies, are clearly shown. It is not necessary to give detailed instructions as to the order in which different phases of the subject may be considered, but the following outline and questions are suggested in the hope that they will enable the student to see the field of study at a glance and devote himself to it in a systematic way.

BUTTERINE, *but'tur in*. See OLEOMARGARINE.

BUTTERNUT, the fruit of the white walnut, so called from the rich oil it contains. The tree grows in the northeastern part of the United States, and may be recognized by its grayish bark, large, yellow-green leaves and pointed, oblong nuts. The wood is light brown in color, and has a coarse grain and satiny sheen. It is used to make interior finishing in houses and in cabinet work.

BUTTERWORT, *but'er wert*, a plant that grows in bogs and marshes, and bears small purple flowers and short, thick leaves. The latter, which cluster about the base of the plant, are covered with hairs that secrete a fluid which attracts insects. The edges of a leaf curl over any insect which lights on it, and the victim is used by the plant as food (see CARNIVOROUS PLANTS). In the northern part of Sweden the leaves of the butterwort are used to curdle milk. The name was applied because of the power of the plant to coagulate milk, also to the fact that the leaves have a smooth, oily, buttery texture. The butterwort is common in North America, Europe and Asia, but is practically unknown in Africa.



BUTTERWORT

BUTTERWORTH, HEZEKIAH (1839-1905), an American editor and writer for young people. He had only a common school education, but he supplemented it by extensive travels in the United States and abroad. In 1871 he became editor of *The*

Youth's Companion in Boston, a position he held till 1894. He is the author of *Zig-zag Journeys, In the Boyhood of Lincoln, The Patriot Schoolmaster* and many other juvenile works, besides several volumes of poems and essays. As a platform lecturer on literary subjects, travel and child training, he achieved considerable fame and popularity.

BUTTONS, articles used for fastening together wearing apparel or for ornaments. Buttons are made of paper, glass, pearl, shell, horn, ivory, vegetable ivory, wood and iron.

The manufacture of buttons became an important industry in England during the reign of Queen Elizabeth, and Birmingham was then, as now, its chief center. Metal buttons were manufactured in the United States at Philadelphia as early as 1750, and in 1800 a button factory was established at Waterbury, Conn. An important button industry grew up in cities on the Mississippi River, where a species of fresh-water mussel, found in large numbers in the river, were used to make pearl buttons.

There are many styles of buttons. Aside from the pearl buttons, those in most common use are made from vegetable ivory, which will take any color, from gutta-percha and from celluloid. Metal buttons are used as society emblems and for other purposes. Some of these, such as those used by the Grand Army of the Republic, are works of art and are made of bronze, gold or silver. There are slightly more than two hundred button factories in the United States, and fewer than a dozen in Canada.

BUZZARD, a hawk of a genus that is common both in Europe and America, though in the United States the name is more commonly applied to the turkey buzzard (which see). The common buzzard of Europe is distributed over the whole of that grand division, as well as over the north of Africa. It feeds upon mice, frogs, toads, worms and insects, and is very sluggish in its habits.

BUZZARD'S BAY, a bay on the south coast of Massachusetts, separated from Vineyard Sound by the Elizabeth Islands. It is thirty miles long and from five to ten miles wide, and contains the harbors of New Bedford, Wareham, Sippican, Nasketucket and Mattapoiset.

BY-LAW, a law made by an incorporated or other body, for the regulation of its own affairs or of the affairs entrusted to its care.

Town councils, railway companies and other bodies enact by-laws, which are binding upon all coming within the sphere of their operations. By-laws must of course be within the meaning of the charter of incorporation and in accordance with any higher law which binds the body or its members.

BYNG, JULIAN, First Viscount of Vimy (1862-1935), a British general, one of Britain's great military leaders in the World War. He had already been distinguished for service in India and South Africa and in 1912 was placed in charge of the army occupying Egypt. From 1914 to the end of the World War he was in command in critical campaigns. Ypres, the Somme and Vimy are associated with his name. From 1921 to 1926 he was Governor-General of Canada; in 1928, he was appointed Commissioner of the London Metropolitan Police, known as Scotland Yard.

BYRD, RICHARD EVELYN (1888-), an American naval officer, noted for his polar explorations, was born at Winchester, Va., of a distinguished Virginia family. He attended the University of Virginia, and the U. S. Naval Academy, from which he graduated in 1912. He remained in the Navy four years, attaining the rank of lieutenant-commander, and then retired because of physical disability.

Byrd's polar experiences began with the Macmillan Polar Expedition in 1925, when he commanded the aviation unit. In 1926, he made the first flight over the North Pole in an airplane, with Floyd Bennett as pilot, from Spitsbergen and return—1,360 miles in 15½ hours. In June, 1927, with three companions, he flew from New York to France. For his polar exploit he was promoted to the grade of commander and received many honors and medals.

The South Polar Expedition, organized by Commander Byrd in 1927-28, was a scientific venture. From his base at Little America, 1,100 miles from the South Pole, he and three companions flew over the Pole on Thanksgiving Day, 1929. For his work on this expedition he was raised in rank to rear admiral, retired. In 1933 Byrd returned to Antarctica for further meteorological observation, and spent an entire sub-arctic winter in solitude, a hundred miles from his base. He reached home in 1935.

Byrd wrote *Skyward* (1928); *Little America* (1930); *Discovery* (1935).



The Castle of Chillon

BYRON, GEORGE NOEL GORDON, Sixth Lord (1788-1824), an English poet of the Romantic Period, whose life and personality have attracted almost as much interest as his poetry. He was handsome and high-spirited, and possessed a passionate temperament that made him bitterly resentful of everything that interfered with him. In fact, he so impressed his own and a later age that the term "Byronic" has come to stand for that which is bitter or satirical.

Until he was seven years of age Byron was entirely under the care of his mother, and to her injudicious indulgence the waywardness that marked his later career has been partly attributed. On reaching his seventh year he was sent to the grammar school at Aberdeen, and four years after, in 1798, the death of his grand-uncle gave him the titles and estates of the family. Mother and son then removed to Newstead Abbey, the family seat, near Nottingham. Soon afterwards Byron was sent to Harrow, where he distinguished himself by his love of manly sports, though a childhood illness had left him permanently lame. In 1805 he was entered at Trinity College, Cambridge. Two years later appeared his first poetic volume, *Hours of Idleness*, which, though containing nothing of much merit, was criticised with unnecessary severity by Brougham in the *Edinburgh Review*. This criticism roused Byron and drew from him his first really notable effort, the celebrated satire, *English Bards and Scotch Reviewers*.



LORD BYRON

In 1809, in company with a friend, Byron visited the southern provinces of Spain and voyaged along the shores of the Mediterranean. The fruit of these travels was *Childe Harold's Pilgrimage*, the first two cantos of which were published on his return in 1812.

The poem was immediately successful and Byron "awoke one morning and found himself famous." During the next two years *The Giaour*, *The Bride of Abydos*, *The Corsair* and *Lara* appeared, and Byron's literary reputation grew steadily. During these years, however, he was living in the most reckless dissipation. In 1815 he married the daughter of Sir Ralph Milbanke; but the marriage turned out unfortunately, and in about a year Lady Byron left him for her father's house and refused to return. This rupture gave rise to much popular indignation against Byron, who left England, with an expressed resolution never to return. He visited France, the field of Waterloo and Brussels, the Rhine, Switzerland and the north of Italy; for some time lived at Venice, and latterly at Rome, where he completed his third canto of *Childe Harold*. Not long after appeared *The Prisoner of Chillon*, *The Dream*, and *Other Poems*; and in 1817 *Manfred*, a tragedy, and *The Lament of Tasso*.

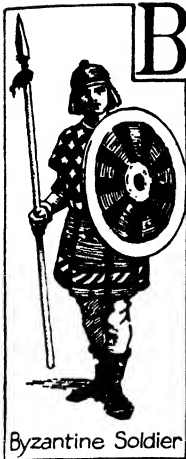
From Italy Byron made occasional excursions to the islands of Greece, and at length he visited Athens, where he sketched many of the scenes of the fourth and last canto of *Childe Harold*. Between 1817 and 1822 appeared, among other poems, five cantos of *Don Juan* and a number of dramas. While living at Pisa he enjoyed for a time the companionship of Shelley, one of the few men whom he entirely respected and with whom he was quite confidential. Besides his contributions to the *Liberal*, a periodical established at this time in conjunction with Leigh Hunt and Shelley, he completed the later cantos of *Don Juan*, with *Werner*, a tragedy, and *The Deformed Transformed*, a fragment. These are the last of Byron's poetical works. In 1823, troubled perhaps by the consciousness that his life had too long been unworthy of him, he threw himself into the struggle for the independence of Greece. In January, 1824, he arrived at Missolonghi, where he was received with the greatest enthusiasm. The malarious air of Missolonghi began to affect his health, and on April 9, 1824, while riding in the rain, he caught a fever, which ten days later ended fatally.

Byron's natural force and genius were perhaps superior to those of any other Englishman of his time, and won for him in his own day a fame second to none of his contemporaries. After his death his work was for

some time as far underrated as it had been overrated during his life, and it is only within the last few decades that a calm judgment has been passed on his writings. His poetry frequently represents his rebellious attitude toward society and convention, and at such times he has a tendency to pose, to utter bombastic statements. At other times, however, he inspires and elevates the reader with lines of noble music and with splendid descriptions of the night and the sea. Altogether, his life and his work were alike unbalanced, and it was his misfortune, and the world's, that he died just as he was beginning to find his best self.

BYZANTINE, *be zan'tin*, **ART**, a style which arose in Southeastern Europe after Constantine the Great had made Byzantium the capital of the Roman Empire (A. D. 330), and ornamented that city with all the treasures of Grecian art. To a certain extent Byzantine art may be recognized as the endeavor to give expression to the new elements which Christianity had brought into the life of men. The tendency toward Oriental luxuriance and splendor of ornament quite supplanted the simplicity of ancient taste. Richness of material and decoration was the aim of the artist, rather than purity of conception. The style made use of Roman constructive principles, Oriental ornamentation and color, and Greek freedom and use of detail.

With regard to the *sculpture*, the statues no longer displayed the freedom and dignity of ancient art. The true proportion of parts, the correctness of the outlines and, in general, the severe beauty of the naked figure or of simple drapery, exemplified in Greek art, were neglected for extravagant costume and ornamentation and petty details. From the sixth to the eleventh century, which was the best period of Byzantine art, figures were produced which possessed considerable beauty and preserved a dignity that was really difficult to obtain with such artificial forms as were created. The artists, who employed no models, naturally departed from nature, and their work is showy rather than beautiful. The figures, with their brilliant costumes, may be readily recognized after they have once been pointed out. One of the favorite branches of the art was mosaic work, and in this the artists succeeded in obtaining a brilliant effect with costly stones. See **ARCHITECTURE**.



Byzantine Soldier

BYZANTINE, *bīzan'tin*, **EMPIRE**, also called the Eastern Greek, or Later Roman Empire. For nearly 1,000 years, from the death of Theodosius the Great, A. D. 395, to the fall of Constantinople, in 1453, it existed as an independent dynasty, standing guard through the Dark Ages against the inroads of the barbarians, and preserving from destruction all that was best in civilization. Its history is long and interesting. Theodosius the

Great before his death divided his dominions between his two sons, Honorius and Arcadius, and the latter became the first of the Byzantine emperors (see THEODOSIUS). He was a weak ruler, who made few attempts to hold the power in his empire, but let it be exercised by his ministers.

During the reign of Theodosius II (408-450) the regency was secured by his sister Pulcheria, and was retained even after he reached his majority. She gave the Empire an able administration, carrying on a successful war against the Persians and recovering for Valentinian III the Western Empire, in return for which service the Byzantine territory received cessions to the westward. The ravages of Attila and the Huns in Thrace and Macedonia were averted only by the payment of annual tribute. On the death of Theodosius, Pulcheria was called to the throne, and she was the first woman to enjoy this dignity. She married Marcianus, whose successful reign continued four years after the death of his wife. Leo I, a hitherto almost unknown Thracian, succeeded, and he was himself succeeded in 474 by Zeno the Isaurian (474-491). Zeno was driven from his capital by Basiliscus, but regained the throne. His empire was threatened by Theodoric and the Goths, but the peril was averted by large presents, and the invaders were induced to march westward to Italy. During Zeno's reign occurred the disastrous fire at Constantinople, by which the library, with more than 100,000 manuscripts, was destroyed. Anastasius (491-518) built the famous "long walls" across the peninsula, to protect Constantinople.

Justin I (518-527) was succeeded by his nephew, the famous Justinian I (527-565), under whom the Byzantine Empire enjoyed the most glorious period of its existence (see JUSTINIAN I; BELISARIUS).

His unfortunate successor, Justin II (565-578) was harassed on one frontier by the Persians, on the other by the terrible Avars. Most of Italy was lost to the Lombards. The reign of Heraclius (610-641) presents a series of overwhelming reverses retrieved by glorious victories. The Persians took Syria, Palestine and Asia Minor, and the invading hordes advanced to a point within sight of Constantinople. Shrewdly gaining time by a humiliating treaty, Heraclius collected his forces and inflicted a defeat upon the Persians at Issus.

The Moslem hordes of Arabs under Mohammed and his successors appeared next. Between 635 and 641 Syria, Judea and all the African possessions were lost. What remained, however, was more closely united than before, and from this time the empire became distinctly Greek in character. The dynasty of Heraclius ended with Justinian II, who was assassinated in 711. The eighth and ninth centuries witnessed a peculiar internal religious controversy, which greatly weakened the defense of the Byzantines against their foreign foes. This was the war of the Iconoclasts, most violent under Leo III, the Isaurian (717-741), himself an ardent Iconoclast (see ICONOCLASTS). Leo's successor, Constantine V (741-775), was also a zealous Iconoclast and closed many monasteries and convents. Image-worship was restored for a brief period by the Empress Irene, who had obtained the throne by blinding her own son, Constantine VI, for whom she was guardian (797). She was ambitious to marry Charlemagne and thus to reunite the Eastern and Western empires, but her plan was not supported. During the reign of Leo V (813-820), the Bulgarians overran Thrace and laid siege to Constantinople, but they were finally repulsed. The Saracens captured Crete and Sicily (824-827). Under Michael III (842-867), who reigned first under the guardianship of his mother, Theodora, the images were finally restored in the Greek Church. It is at this time that the Russians first appear as enemies of the Empire.

The Macedonian dynasty (867-1057) was founded by Basil I, during whose reign the

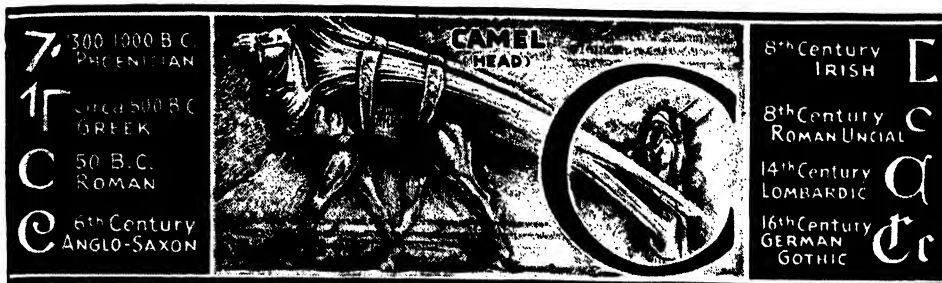
Saracens conquered Sicily and ravaged the Peloponnesus. His son, Leo II (886-912), called in the Turks to aid against the Saracens, and thus the former paved the way for future conquests. Under Basil II the Bulgarian kingdom was overthrown, and that country became a Greek province (1018), remaining so until 1186. About the middle of the eleventh century the Seljuk Turks became threatening, and in Italy the Byzantine possessions were nearly all seized by the Normans. Isaac, the first of the Comneni, reigned from 1057 to 1059. Under his successors the inroads of the Seljuks became more frequent, and by 1078 they had conquered nearly all of Asia Minor.

The steady advance of the Mohammedan power alarmed all Christian Europe, and during the reign of Alexius Comnenus (1081-1118), began the wonderful movement of allied Christendom known as the Crusades (see CRUSADES). As the hosts marched toward Asia Minor *via* Constantinople, the movement could not but have an important influence on the fortunes of the Byzantine Empire. Alexis wanted help against the Turks, but the vast numbers that came alarmed him, and their depredations within his territory led to serious conflicts, and finally, under later emperors to open hostility. In 1204 Constantinople was taken by the

Crusaders, who established the Latin Empire (1204-1261), with Count Baldwin of Flanders as first emperor. This Latin Empire was never strong, and in 1261 the emperor of Nicaea, Michael Palaeologus, captured Constantinople and reestablished the Greek Empire.

Michael (1261-1282) founded the dynasty of the Palaeologi, which lasted until 1453. He made fruitless efforts to reunite the Greek and the Latin churches. His son, Andronicus II (1282-1328), attempted to repel the Turks, but in the following reign they took Nicaea and Nicomedia. In 1361 the Sultan Amurath took Adrianople, and he afterward conquered Macedonia and part of Albania, whereupon the emperor, John (1341-1391), acknowledged himself Amurath's vassal and agreed to pay tribute. The Turks attacked Constantinople in April, 1453, with an army of 400,000 men, under Sultan Mohammed II. The garrison held out until May 29, when the city was finally taken, Constantine, the last of the Byzantine emperors, falling in the thick of the fight. The various principalities and islands were conquered by 1461, and the last vestige of the Byzantine Empire had disappeared.

BYZANTIUM, *be zan'she um*, the original name of the city of Constantinople (which see).



C, the third letter in the English alphabet and in all other alphabets derived from the Phoenician. It occupies the same place as the Greek *gamma*, and it originally had a similar sound, that of hard *g*. In English, *c* now represents two perfectly distinct sounds, namely, the guttural sound belonging to *k* and the sharp or thin sound of *s*; while it also forms with *h* the digraph *ch*. It may be said, in general, that *c* has the *k* sound before the vowels *a*, *o* and *u*, the *s* sound before *e*, *i* and *y*. The digraph *ch* has three different sounds, as in *church*, *chaise* and *chord*.

In music, *C* is the first or key note of the diatonic scale of *C* major. When placed after the clef sign, *C* is the mark of common, or $\frac{4}{4}$ time. As an abbreviation, *C* stands for one hundred and for Centigrade; *c* stands for cent.

CABAL', the name given to a group of men who are banded together for the promotion of their own interests, especially political interests. The name is said to be derived from the initial letters of the names of the cabinet of Charles II—Clifford, Ashley, Buckingham, Arlington and Lauderdale, who formed the most famous cabal in English history. The most notable one in America was the Conway Cabal (which see).

CABBAGE, *kab'aj*, a common garden vegetable cultivated for its edible leaves, which in the common varieties are crowded together in dense heads. The wild cabbage is a native of the coasts of Britain, but it is much more common on other European shores. The kinds most cultivated are the common cabbage, the savoy, the broccoli and the cauliflower. The common cabbage forms its leaves into heads or bolls, the inner leaves being nearly white. Its varieties are the white, the red or purple, the tree or cow cabbage, for cattle, and the very delicate

Portugal cabbage. The garden sorts form valuable culinary vegetables and are used at table in various ways.

In Germany pickled cabbage forms a national dish. It is known there as *sauerkraut*, and this German name has been adopted for that commodity in the United States and England. The cow cabbage of the Channel Islands attains gigantic proportions for a vegetable, and the stalks, which frequently grow to heights of twelve or sixteen feet, are used as rails for fences and as rafters for the thatched roofs of farm buildings, while shorter ones are made into umbrella handles and walking sticks, which are much in demand as curiosities among tourists. In the United States raising cabbages on truck farms near large cities constitutes an important industry.

Cabbage Worm. This is the most destructive of the cabbage enemies. It is the young of the white butterfly, common from early spring through the summer. There are several species. Cabbage worms are bluish-green in color, about an inch and a half in length, and are very destructive, feeding on the leaves and burrowing into the head of the cabbage. There is an almost equally destructive worm from the cabbage moth, dark in color. Destruction of cabbages may be prevented by spraying the plants with kerosene emulsion before the heads form.

CABBAGE PALM, a name given to various species of palm trees, because the terminal bud, which is of great size, is edible and resembles a cabbage. It is a species of the areca palm (see *ARECA*). The palmetto is a variety of cabbage palm found in the West Indies and Southern United States. See *PALMETTO*.

CABBAGE ROSE, a species of rose of many varieties, supposed to have been cultivated from ancient times, and eminently

fitted, because of its fragrance, for the manufacture of rose water and attar. The name Provence rose is sometimes given this species.

CABINET, the body of ministers or secretaries who direct the various executive departments of a government. In Great Britain it is also called the Ministry.

The American Cabinet. In the United States the Cabinet contains ten members, appointed by the President, who become his advisers and under him control all executive functions. The following titles are given to the members:

Secretary of State
Secretary of the Treasury
Secretary of War
Attorney-General
Postmaster-General
Secretary of the Navy
Secretary of the Interior
Secretary of Agriculture
Secretary of Commerce
Secretary of Labor

Appointments to these posts must be approved by the Senate of the United States, but no appointee has ever been rejected by the Senate, for it is admitted that the President's selections for his intimate official family should not be challenged. Members of the Cabinet do not hold seats in the legislative body (Congress) as is the case in Great Britain, where they are members of Parliament.

Cabinet members make annual reports of their departments to Congress, but in all their official acts they are responsible to the President only. The salary of a Cabinet member is \$15,000 per year; the appointment has been deemed as for the Presidential term, although President Wilson in 1917 retained the Cabinet from his first administration without reappointment.

For details as to each Cabinet office, see the various titles, in alphabetical order in these volumes.

The British Cabinet. The executive authority in Great Britain is nominally invested in the Crown, but so thoroughly democratic is the country that all responsibility for many years has been vested in the Parliament and the Ministry, or Cabinet. The number of members in the English Cabinet varies from time to time, as special needs may dictate. During the World War there were a Minister of Munitions, an Air Ministry, a Minister of Blockade, and a Ministry of Reconstruction. There never are fewer than eleven members. The follow-

ing may be considered the usual membership:

First Lord of the Treasury
Secretary of State for Foreign Affairs
Lord Privy Seal
Lord President of the Council
Lord Chancellor
Chancellor of the Exchequer
Secretary of State for Home Affairs
Secretary of State for the Colonies and Dominions
Secretary of State for War
Secretary of State for India
Secretary of State for Air
First Lord of the Admiralty
President of the Board of Trade
Minister of Health
Minister of Agriculture and Fisheries
Secretary for Scotland
President of the Board of Education
Minister of Labour
Chancellor of the Duchy of Lancaster
First Commissioner of Works

The members of the Ministry are chosen by the Prime Minister (which see), who selects them as "persons whose responsible situations in public office require their being members." The Prime Minister may hold one of the Cabinet places if he so desires. All Cabinet members are also members of Parliament, and are chosen from the party in political control; if the House of Commons by vote on an important measure shows lack of confidence in the Cabinet it resigns in a body and a new Cabinet, which will reflect the will of the majority, is formed. Meetings of the Cabinet are secret, and no record is kept of the proceedings.

There is no legal recognition of the English Cabinet, and the same can be said of that of the United States, for the Constitution makes no reference to such a body. The English custom has grown from the time of William III.

The Canadian Cabinet. The executive department of the Dominion of Canada is based on that of the mother country. Members of the Cabinet are chosen by the Prime Minister; they must be members of the Canadian Parliament, and their number varies from sixteen to twenty. Ministers in charge of departments receive the usual departmental salaries, also the additional salaries provided for members of Parliament. The names of the usual offices follow:

1. The President of the Council presides over the meetings of the Ministry. He has no executive duties, except such as relate to the work of the council as a whole. This office is

usually, though not necessarily, held by the Premier (see subhead, below).

2. The Minister of Justice and Attorney-General of the Dominion is the legal adviser of all the government departments. The administration of justice, including the control of the Royal Northwest Mounted Police and of prisons, is in his hands. He also reviews all the laws passed by the provincial legislatures.

3. The Minister of Finance has charge of the Dominion finances. He presents the annual budget to Parliament, explains the government's financial policy as regards the raising and expenditure of revenue, and is responsible for the collection and distribution of funds. See Budget.

4. The Minister of Trade and Commerce executes all laws relating to commerce, industry and allied subjects which are not definitely assigned to some other department. He is also in charge of the census and statistics branch, which was formerly a part of the Department of Agriculture.

5. The Minister of Agriculture, besides the division of industry which gives him his title, has charge of public health, copyrights, trademarks and patents.

6. The Minister of Marine and Fisheries has supervision of the ocean and inland fisheries, of the lighthouse and life-saving service, of the examination of ships' captains and mates, harbors, piers and docks and practically the entire field of fisheries and navigation. The Minister of Marine and Fisheries also acts as Minister of Naval Service.

7. The Minister of National Defense is responsible for the administration of all military affairs, including the military college at Kingston, Ontario. He acts as president of the militia council, which is composed of the Minister, the Deputy Minister, the Chief of the General Staff, and three other officers of the army; this council advises the Minister of Militia.

8. The Minister of the Interior is in charge of the government of the Northwest Territories, the Indians, public lands, forestry branch and the geological survey.

9. The Minister of Railways and Canals is responsible for the management of the Canadian National Railways, owned by the Dominion government, and for a general supervision of the government canals. He also has some duties in connection with general problems of transportation.

10. The Minister of Public Works has charge of the construction and maintenance of all public works and buildings, except railways and canals.

11. The Postmaster-General controls the management of the Postoffice Department.

12. The Minister of National Revenue manages the collection of customs and excise duties and income tax.

13. The Minister of Immigration and Colonization handles immigration problems.

14. The Minister of Labor acts as arbitrator in labor troubles, and under specified conditions may intervene to end strikes. He may

also investigate labor conditions generally and issue reports on them.

15. The Minister of Mines investigates the mineral resources and conditions of the mining industry and issues reports of his findings. He has comparatively few duties and usually holds another position in the Ministry.

16. The Secretary of State registers all documents under the great seal of the Dominion, has charge of public printing and of all official correspondence between the Dominion and provincial governments.

17. The Secretary of State for External Affairs has charge of relations with the British and foreign governments. This office is usually held by the Premier.

CABINET MAKING, the art of producing fine woodwork by hand labor, too delicate and artistic to be made by machinery. The art includes not only fine tables and cabinets, but the exquisite work on the interiors of railway cars, steamer rooms, wainscoting, and the like. The harder the wood employed and the finer its grain the more beautiful is the effect produced. After the desired forms are in place, cabinet making includes sandpapering, filling and varnishing or staining. Fine inlays are among the highest development of the craft.

CABLE, GEORGE WASHINGTON (1844-1925), a popular American author of stories having a background of Louisiana and Mississippi River life. He was born in New Orleans. Cable's father died when the boy was fourteen, and George went to work to help support the family. At nineteen he enlisted in the Confederate army and fought until the close of the war. While working as an accountant for a cotton firm, he devoted his leisure time to searching among the old records in the archives of New Orleans. So fascinated was he by the tales there recorded that he incorporated them in some stories of his own, and between 1873 and 1876 six of these were published in *Scribner's Monthly*. When the stories were issued in 1879 under the title *Old Creole Days*, the book was an immediate success. Cable's vivid style, his skilful use of the Creole dialect and the exotic beauty of his narratives brought him recognition as the creator of a new type of fiction. He was now launched on a literary career, and wrote, among other books, *Bonaventure*, *Strange True Stories of Louisiana*, *The Grandissimes*, *Dr. Sevier*, *Strong Hearts*, *The Cavalier*, *Bylow Hill*, and a series of papers urging social justice. In later years he toured the country reading from his own works.



CABLE, SUBMARINE, the great invention in 1842 which made it possible for the countries of the world to become neighbors in a sense never before thought possible. A telegraph line under water in that year was proved feasible, and was the herald of the day, ten years later, when the great nations began the task of linking the continents with wires on the bed of the ocean.

Up to that time weeks and even months elapsed before news of tremendous happenings in any continent could be carried across the seas. To-day no event of importance can happen in any populous center that is not "news" in the next edition of the daily newspapers everywhere.

The Cable. As stated above, a submarine cable is a telegraph line under water. But the cable does not look like the familiar telegraph wire, for the cable wire must be protected from moisture and from possible accidents due to action of waves near shore. A cable consists of a core of copper wire made by twisting together from three to six wires, in an insulating case of permalloy, around which gutta-percha is wound; a protecting case of wire rope, which in turn is wound with jute yarn saturated with pitch or some other bituminous compound to protect it from the water.

The size of the cable varies according to the stress which it must withstand. It is largest near the shore, where the wear is greatest and where it is subject to danger from anchors. In the deep sea the standard size is a little less than an inch in diameter. Cables are laid on the bottom of the body of water which they traverse, and they are anchored at the land ends, but otherwise they are not fastened. The ends are connected with transmitting and receiving apparatus constructed especially for this sort of telegraph and differing considerably from the ordinary telegraph instruments. The resistance to the electric current is much greater in a cable than in an ordinary telegraph line. A strong current would inevitably burn the insulation and destroy the cable; so the current employed is weak and therefore requires very delicate instruments.

The Instruments. The receiver in most general use consists of an apparatus invented by Lord Kelvin, containing a glass tube in the form of a siphon, one end of which dips into an ink reservoir while the other is drawn to a very fine tip which rests just above the surface of a paper tape that is caused to move uniformly over a table. When in action, the electric current swings the point of the pen to the right and left, and at the same time causes the ink to flow on the ribbon in minute drops, forming a wavy line, a part of which is above and a part below a line drawn lengthwise through the middle of the tape. The portions of the line on the upper half of the tape are read as dots, and those in the lower half as dashes. By use of this device the message is read in the Morse alphabet.

The earliest cables were defective and in an experimental stage, and messages could be sent but slowly. The first message, to Queen Victoria, ninety words in length, required over an hour for transmission. By the "duplex" system four messages can be sent in each direction at once.

The First Cables. The early cables were short, and connected places only a few miles from each other. The first successful attempt to telegraph under water was made by Prof. S. F. B. Morse, in 1842. He laid a copper wire, insulated by a covering of hemp, pitch, tar and rubber, from Governor's Island to the Battery, in New York City, and was enabled to send and receive signals over it. The wire was soon caught by the anchor of a ship and broken, but the experiment was sufficiently successful to warrant the conclusion that cables of greater length could be made to work successfully. Ten years later a cable seventy-five miles long was laid between Dover and Ostend, and this also worked successfully. A little later a number of short cables were laid.

Atlantic Cables. For many years there was but one cable under the oceans, and it was world-famous as the Atlantic Cable. It extended from Heart's Content, Newfoundland, to Valentia Bay, Ireland, and was 2,500 miles long. In 1854 the Atlantic Telegraph Company was organized through the efforts of Cyrus W. Field of New York, who secured the coöperation of English and American capitalists. The cable constructed by this company was of the pattern in general use at the present time.

The first cable was completed and loaded on two ships, which were loaned respectively by the governments of Great Britain and the United States. The first of these vessels, the *Niagara* began laying the cable from Valentia, August 6, 1857, but when several hundred miles had been paid out, the cable broke and the vessels were compelled to return to Plymouth, where the cable was stored until the following year, during which time enough new cable was made to supply the loss sustained by the break. At a second attempt the ships sailed to a point midway between the terminals, joined the cable together and proceeded in opposite directions. This cable was successfully laid, on August 17, 1858, connections with the transmitting and receiving instruments were completed, and congratulatory messages passed between the president of the United States and the queen of Great Britain; but after a short time the cable ceased to work.

Notwithstanding all of the difficulties which he had encountered, Mr. Field continued to arouse interest in his enterprise. A third cable was constructed and loaded upon the *Great Eastern*, at that time the largest steamship that had ever been constructed. The laying of this cable began in August, 1865, but after a thousand miles had been paid out the cable broke, and the lost end could not be recovered. This necessitated the making of a new cable, which was successfully laid the following year and has continued to work, with few interruptions, since.

Pacific Cables. There are American and British cables connecting the western coast of North America with the Orient. The former was constructed and laid by the Commercial Pacific Cable Company; it extends from San Francisco to Shanghai and Manila, by way of Honolulu, Midway Island and Guam. Its entire length is 10,061 nautical miles. The average depth of the ocean bed over which it is laid is three miles. The construction and laying of the cable were completed within eighteen months of the organization of the company, and its completion on July 4, 1903, placed the United States in direct communication with all of its island possessions in the Pacific without the use of foreign lines.

The first British cable connected British Columbia with Australia, and it was constructed conjointly by the governments of

Great Britain, Canada, New Zealand and Australia. It extends from Vancouver, British Columbia, to Palmyra, in the Fiji Islands, thence to the Norfolk Islands, from which branches extend to New Zealand and Queensland, Australia. Its entire length is 16,500 miles. It was completed in 1902, and it placed the British possessions of the Pacific Ocean in direct communication with the United States and Canada.

Statistics of Construction. At the present time there are more than twenty cables between Europe and the United States, over thirty between Europe and South America, and six between the United States and the Orient, across the Pacific Ocean. In 1935 there were 506 cables, including short lines, aggregating 265,000 miles of wire, owned by private companies; 2,169 cables of various lengths, with 85,000 miles of wire, were owned by governments. British private companies own and operate 144,000 miles of wire; American, 85,000 miles; French, 20,000 miles; all others, 16,000 miles.

Related Articles. Consult the following titles for additional information:
Morse, Samuel F. B. Wireless Telegraph
Telegraph

CABOT, kab'ot, JOHN (1450-1498) and **CABOT**, SEBASTIAN (1474-1557), two famous navigators, father and son, who contributed to England's greatness. John Cabot was born in Genoa, Sebastian in Venice. In 1484 the family removed to England, and at the time Columbus made his first voyage John Cabot was a trader of Bristol. He had for some time been interested in the idea of finding a shorter route to the East Indies, and in 1497 he sailed westward under the authority of King Henry VII. Whether or not Sebastian accompanied him is a matter of uncertainty. In June of that year the ship reached the North American coast near Cape Breton, and to that land Cabot laid claim in the name of the the king of England. It was this voyage that gave England its claim to the possession of the North American mainland.

In 1498 John Cabot made a second voyage to the North American coast, and at this time he explored in the vicinity of Greenland and Baffin's Bay. After the death of his father Sebastian was for several years in the Spanish service, visiting Brazil and the Rio de la Plata. Returning to the service of England, he was made chief pilot and later governor of an important trading company.

CABRAL, *ka brahl*, PEDRO ALVAREZ (1460-1526), a Portuguese navigator and explorer, famous chiefly for one voyage, made during the winter of 1500-1501. He set out for the East Indies by way of the Cape of Good Hope, but was driven west by adverse winds and the equatorial current and touched Brazil, of which he took possession in the name of the king of Portugal. A Spaniard had previously touched this coast, but Portugal claimed Brazil by virtue of the so-called line of demarcation, which divided certain lands of the New World between Spain and Portugal. After Cabral had reached Brazil he started out again for India and made the first commercial treaty of Portugal with the natives of the East. See DEMARCATION, LINE OF.

CACAO, *ka ka'ō*, or **COCOA**, *ko'ko*. The first of these terms is the correct name for a tropical evergreen tree from which choco-



CACAO PODS

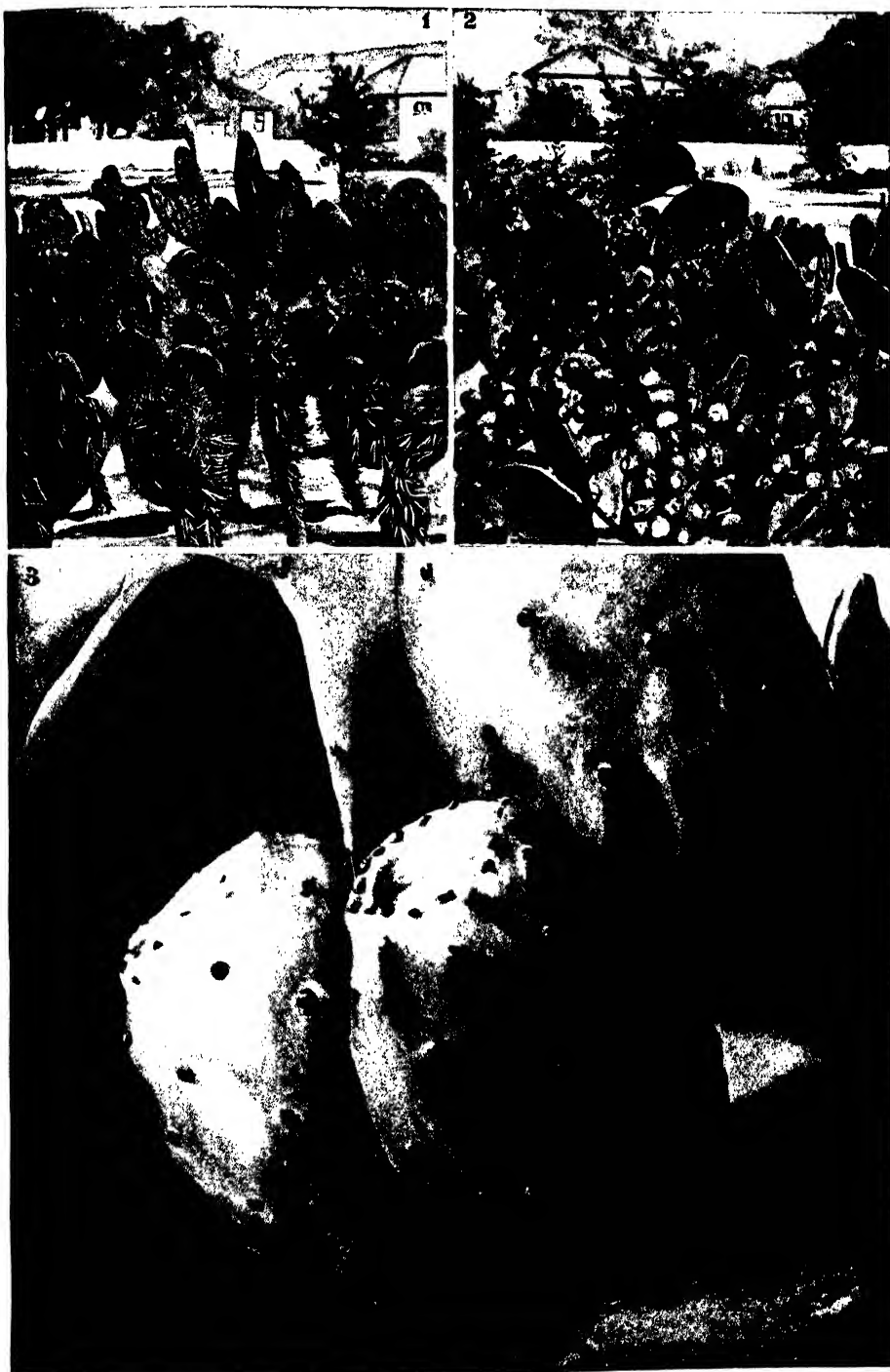
late and cocoa are obtained. While *cocoa* is a misspelling for *cacao*, its use has become so firmly fixed that by general agreement it is applied to the powdered commercial product and to the beverage, while *cacao* is used for the tree and the raw product.

The cacao tree is cultivated in warm, moist countries of the tropics, in both hemispheres. Ecuador was formerly the leading cacao country, but the crop has fallen off because of the "witch broom" disease, and Brazil is now the chief center of world production. Other important areas include the Gold Coast of British West Africa, the East and West Indies, the island of Sao Thomé, in the Gulf of Guinea, Venezuela, Colombia, Trinidad, Central America and Southern Mexico. The

plant grows from fifteen to twenty-five feet tall, with occasional large trees reaching a height of thirty feet. Its dark-green leaves, growing in profusion on the branches, form a protecting screen from the tropical sun for the oval, deeply ribbed pods, which contain the seeds, or beans. These pods, like the small scentless flowers, are attached to the main trunk and larger branches, hanging by very short stems and seeming almost to be growing out of the bark (see illustration). The ripened pods of different species vary as to size and color; the average length is six to eight inches, and the colors may be red, golden-yellow, purple or brown.

Within the pod is a lining of white, sweetish pulp; and the clustered almond-shaped seeds, which are also covered with pulp, may number from twenty to fifty or more. A thin shell covering offers protection to the kernels, or nibs, the source of chocolate and cocoa. In the preparation for market, the pods are split open and the beans, with the pulp adhering, are placed in large vats for fermentation, through the action of bacteria and cacao ferments. This process loosens the pulp and causes a desirable aroma to develop in the kernel. The beans are then washed, polished and dried, graded into sizes, and packed into bags for shipment to the factories for roasting. Roasting takes place in heated rotating cylinders, and serves to eliminate the bitter taste of the raw bean, develop aroma and make the shells crisp, so that when the roasted beans are cracked, the particles of shell can be easily removed in separating machines.

The kernels, or nibs, are then subjected to a series of grinding operations to liberate the fat. Cocoa and unsweetened chocolate differ only in the amount of fat left in the product. According to the Pure Food Law, chocolate must have at least fifty per cent of cacao fat; cocoa may have any amount, but no product may be labeled "breakfast cocoa" which contains less than twenty-two per cent. (For the uses of chocolate, see that title.) Because cocoa contains less fat than chocolate, the hot drink made from it is more digestible and also blends more readily with water. For children, cocoa should be made with milk. The cacao bean contains an alkaloid that is somewhat stimulating, but only traces of the drug are present in milk cocoa. Cocoa butter is the solid oil extracted in the manufacture of cocoa. It is used in making candy, cosmetics



LUTHER BURBANK'S DEVELOPMENT OF THE CACTUS

1- Useless, thorny growth. 2- The cactus in the foreground is an early stage, enlarged, showing a true fruiting stage.



Galloway



Galloway

STRANGE FORMS OF THE CACTUS

Upper left, giant cactus, a few miles from Mexico City;
upper right, another giant specimen, the Saguaro,
near Phoenix, Arizona; lower left, the flowerless Banel
cactus; right, a Tuna cactus garden in Mexico.



Taylor



and ointments. The United States imports annually over 606,000,000 pounds of raw cacao.

CACHALOT, *kash'a lot*. See SPERM WHALE.

CACTUS, a genus of peculiar plants which grow in dry, warm climates. The cacti generally are shrubs having juicy stems, which are covered with minute, scalelike leaves and clusters of sharp spines. In one species only are the leaves at all large. The fleshy stems assume many extraordinary forms, from the branching, treelike cactus to the globe-shaped varieties, both of which are found in the Southwestern United States, where the plants grow in abundance. Although the plant has been introduced and become naturalized in many parts of the Old World, yet all, with the exception of one species, are natives of America. Of some species the fruits are edible, and many furnish large and exceedingly beautiful flowers. It is a cactus plant upon which the cochineal insect lives. See COCHINEAL; CEREUS; PRICKLY PEAR.

Spineless Cactus. Travelers in the southwestern part of the United States find never-ending cause for remark in the millions of acres of land which appear absolutely worthless without water furnished by irrigation systems, as only sage brush and cactus can be made to grow there. Realizing the latent possibilities of the cactus, Luther Burbank set about converting the plant into a food plant for man and animals. In the process of the development of the cactus he first removed the thorns which covered the entire plant. Then by processes of patient development he converted a thorny, worthless plant thriving upon nonproductive land, into a plant the leaves of which are nutritious food for all kinds of stock; the joints of which make excellent pickles; a wholesome food, when fried; a sweetmeat, when preserved. The fruit combines the flavor of the pear and the banana, sells for a price equal to the value of oranges, and is produced at one-half the expense. It is believed there never can be a failure in the cactus crop. The fruit is made into jams, jellies and syrups. Respecting the development of the cactus, we quote from Luther Burbank:

The population of the globe may be doubled, and yet in the immediate food of the cactus plant itself, and in the food-animals which may be raised upon it, there would still be enough for all.

Six months after planting, some varieties of cactus will produce seventy-five tons of food to the acre; after the second year a production of 150 tons to the acre is possible. A cactus leaf ten inches across will develop thirty-six full-sized cactus pears.

CADDICE FLY, or **CADDIS FLY**, a little insect which looks much like a moth. Its eggs are laid in the water, attached to some plant. When they hatch, the larvae, which have strong heads and jaws but very delicate bodies, form over the latter a firm case of mud, stones, grass or roots and live under the water until they are ready to emerge from the pupa state. In some species the cases are spiral, like snail shells. The caddice worms are used as bait by anglers.

CADDOAN INDIANS, a group of Indian tribes now nearly extinct. Formerly they lived in the country from the Brazos River as far east as Louisiana, and consisted of about a dozen agricultural tribes. Important branches of the group were the Caddo, Wichita and Pawnee. See PAWNEE.

CADET, *ka det'*. A student in a school for military training, or a candidate for a military commission. See MILITARY ACADEMY, UNITED STATES; NAVAL ACADEMY, UNITED STATES.

CADILLAC, ANTOINE DE LA MOTHE (1660-1720), a French explorer and administrator in French America, who held the confidence of King Louis XIV. After serving as governor of Mackinac (now in Michigan), Louis promised to help him found a new post which should be a new commercial center in the Canadian northwest; Cadillac chose the present site of Detroit and founded that town in 1701. Soon thereafter he was sent south, where he held the Miami Indians within bounds, and was governor of Louisiana from 1712 to 1717. He was recalled because of his quarreling disposition.

CADIZ, *ka'diz*, SPAIN, capital of the province of the same name, is an important Atlantic seaport situated sixty miles northwest of Gibraltar. It is well built and strongly fortified, and is well paved and very clean. The chief buildings are the great hospital, the customhouse, the old and new cathedrals, the theaters, the bull ring, capable of accommodating 12,000 spectators, and the lighthouse of Saint Sebastian. The Bay of Cadiz, a large basin enclosed by the mainland on one side and a projecting tongue of land on the other, has a good anchorage,

and is protected by the neighboring hills. Cadiz has long been the principal Spanish naval station. Its trade is large, its exports being, especially, wine and fruit. Cadiz was founded by the Phoenicians about 1100 B. C. and was one of the chief seats of their commerce in the west of Europe. In the first Punic War it fell into the hands of the Carthaginians, and in the second Punic War it surrendered to the Romans. Population, 1933, 75,500.

CADMIUM, a scarce metal which resembles tin in color and luster, but is a little harder. It is very ductile and malleable, and it fuses a little below a red heat. In its chemical character it resembles zinc. It occurs in the form of carbonate, as an ingredient in various kinds of calamine, or carbonate of zinc. It is also found in the form of a sulphide, as the rare mineral greenockite. Cadmium forms many compounds, of which the sulphide, an orange or lemon-yellow powder used as a coloring agent under the name of *cadmium yellow*, is the most important.

CADMUS, in Greek legend the son of Agenor and the brother of Europa. When Europa was carried off by Jupiter in the form of a bull, Cadmus was directed by his father to hunt for her and not to return without her. With his brothers, he set forth on the long quest. One by one the brothers became tired out and stopped by the wayside, but Cadmus kept on until informed by an oracle that his search was useless. This oracle also directed him to follow a cow which he should shortly meet; and where she should lie down there he was to found a city. He carried out these instructions, and the city which he founded was Thebes in Boeotia. After killing a dragon which guarded a fountain near the site of his proposed city, Cadmus sowed the teeth of the dragon and there sprang up a group of armed men. These men contended with one another until all but five of them fell, and these five became, with Cadmus, the first inhabitants of the new city. Many inventions and the introduction of the Phoenician alphabet into Greece were ascribed to Cadmus.

CADUCEUS, *ka du'se us*, a winged rod entwined with serpents, borne by Mercury as an ensign of quality and office. In modern times it is used as a symbol of commerce, since Mercury was the god of commerce. The rod represents power; the serpents, wis-

dom, and the two wings, diligence and activity.

CAEDMON, *ka'd'mon*, the first Anglo-Saxon of note who wrote in his own language. He flourished about the end of the seventh century. He was originally a tenant, or perhaps only a cowherd, on the abbey lands at Whitby, but afterward was received into the monastery. According to Bede's *Ecclesiastical History*, Caedmon received one night a vision which commanded him to sing the praise of God, and his poetical work began at that time. His chief work (if it can all be attributed to him) consists of paraphrases of portions of the Scriptures, in Anglo-Saxon verse, the first part of which bears striking resemblances to Milton's narrative in *Paradise Lost*.

CAESAR, *se'zar*, a title, originally a surname of the Julian family at Rome, which after being dignified in the person of the dictator Caius Julius Caesar, was adopted by the successive Roman emperors. The title is perpetuated in the modern forms *kaiser* and *czar*.



One of
his soldiers

CAESAR, *se'zahr*, **CAIUS JULIUS** (100-44 B. C.), a famous Roman general, statesman and historian, son of a Roman praetor of the same name. He was one of those great men of history whose work affected not only his own times, but the history of the world for generations afterward. Great as a warrior, he was also a farseeing statesman, and in oratory and literary ability he ranked with the foremost men of his day. Every high school student who has translated his *Commentaries on the Gallic War* has read a masterpiece of concise historical writing.

Early Career. Caesar was born of an aristocratic family, but his early sympathies were in favor of democracy, and they were strengthened by his marriage with Cornelia, daughter of Cinna. Refusing to divorce her at the command of Sulla, he was proscribed and compelled to flee from Rome, but after the death of Sulla he returned and again took part in public affairs. He espoused the

cause of the people, and sought in various ways to win their favor. For his second wife he married a relative of Pompey, leader of the popular party. In 67 B. C., at the funerals of his aunt and his first wife, he eulogized their relatives, Marius and Cinna, who had been idolized by the masses. Three years later, when Caesar was curule aedile, he had the trophies and statue of Marius secretly replaced in the Capitol. His attempt to procure the Roman franchise for the Latins beyond the Po won for him the sympathies of the Italians. The people bestowed various offices on him, and he increased his popularity by lavish expenditures for their entertainment.

Rise to Power. C^{at}iline's outbreak (63 B. C.) brought discredit on all members of the popular party, Caesar not excepted, although it is thought extremely unlikely that Caesar was concerned in it. After a year spent in Spain as *propraetor*, Caesar returned to Rome, where he became consul. To gain the assistance of colossal wealth, he made a coalition with Crassus, who, being inferior in intellect, became a tool to work C^{ae}sar's will in the accomplishment of his ambition to become master of the Roman world; and on Pompey's return to Rome, Caesar succeeded in reconciling Pompey and Crassus.

Just prior to taking up his duties as consul, Caesar formed with Pompey and Crassus the so-called First Triumvirate. This was not an organized form of government, but simply a union to promote the interests of its members, and in this it differed from the later triumvirates. As consul, Caesar won the favor of the populace by the agrarian law providing for the distribution of land among the poor. After the expiration of his term as consul, Caesar secured a military command in the West, where he hoped to make himself a position similar to the one held by Pompey in the East. Having received the right to conquer Gaul, with the command of four legions of soldiers, he was fairly launched upon the military career destined to make him master of the Roman world. For nine years he was in Gaul, and the final subjugation of the Gauls was accomplished in nine campaigns.

The Conqueror. In his first campaign he defeated the Helvetii, sending the survivors home to cultivate their land while he overthrew Ariovistus, a German prince who had invaded Gaul. His second campaign was

against the Belgae, and in it he defeated four allied tribes united for the defense of Gaul. After wintering at Luca and spending large sums in hospitality, he turned against the Venetii, defeating them totally in his third campaign. His fourth campaign was against two German tribes invading Gaul, whom he defeated and followed across the Rhine. The same year (55 B. C.) he invaded Britain, and won from the senate a thanksgiving lasting twenty days. His second invasion of Britain (54) resulted in the subjugation of the Britons, but it was a nominal subjugation only, as he left no troops to hold the land. His sixth campaign was against revolting Gallic tribes, who were soon reduced to obedience. His most brilliant victory was won in the next year over Vereingetorix, who led a revolt of nearly all the Gallic nations. In the eighth and ninth campaigns (51-50) he accomplished the final subjugation of all Gaul.

Meanwhile matters had changed much in Rome. A stronger alliance of the triumvirs had been formed at

Luca, when Caesar was wintering there, but after the death of Crassus, Pompey was forced into a hostile attitude toward Caesar. In 52 Pompey joined the senatorial party against Caesar and procured the passage of a decree ordering the disbanding of Caesar's army. Caesar, with his legions, promptly crossed the Rubicon, which separated his provinces of Gaul from Italy, and advanced toward Rome. Pompey, with the senate and nobles, fled to Greece, and in three months Caesar was master of all Italy. He enjoyed his victory but a short time before he hastened to Spain to overthrow Pompey's legates there. On his return from this expedition he was appointed dictator, an office which he held but eleven days. In January he followed Pompey into Greece and defeated him on the plains of Pharsalia, August 9, 48 B. C. When the news of this victory reached Rome, Caesar was appointed dictator for one year, consul for five and tribune for life.

Before Caesar again returned to Rome he brought to a successful issue the Alex-



A ROMAN COIN

andrian War, undertaken to satisfy the claims of Cleopatra against her brother Ptolemy. Returning through Pontus, he defeated Pharnaces and informed the senate of his victory in the laconic dispatch, "*Veni, vidi, vici*" (I came, I saw, I conquered). He defeated the party of Pompey under Scipio at Thespius, and Cato killed himself at Utica rather than fall into the hands of this universal conqueror. Now undisputed master of the Roman world, Caesar showed his greatness and magnanimity by pardoning the followers of Pompey. The dictatorship was bestowed upon him for ten years by a grateful people, and his victories were celebrated by magnificent triumphs.

His Downfall. After his return from defeating the two sons of Pompey in Spain (45), fresh honors were conferred upon him. He was made *imperator* for life, and his portrait was stamped upon the coins of the realm. In the correction of the calendar, which had fallen into great confusion, he performed an important service, and he proposed many public improvements, such as founding public libraries, draining the Pontine marshes, enlarging the harbor at Ostia and digging a canal across the isthmus of Corinth. None of these designs, however, was he allowed to carry out. After the crown had been offered him at a public festival, the aristocracy, all of whom had received favors at his hands, conspired against his life. On March 15, 44 B. C., he was assassinated, receiving over a score of wounds from the daggers of men whom he had believed were his friends.

Related Articles. Consult the following titles for additional information:

Antony, Mark	Crassus, Marcus L.
Brutus, Marcus Junius	Pompey
Calendar	Rome, subhead History
Catiline	Rubicon
Cinna, Lucius Cornelius	Sulla, Lucius Cornelius
Cleopatra	Triumvirate

CAESIUM, *se'zeum*, a rare metal, first discovered by Bunsen and Kirchhoff by spectrum analysis in 1860. It is soft, and of a silver-white color. It is always found in connection with rubidium and belongs to the same group of elements as lithium, sodium, potassium and rubidium, that is, the group of the alkali metals.

CAFFEINE, *kaf'fe'in*, or **THEINE**, *the'in*, the active principle of tea and coffee, a slightly bitter, highly nitrogenous substance, crystallizing in slender, silklike needles. It is found in coffee beans, tea

leaves, Paraguay tea and kindred plants. Coffee contains from 0.8 to 3.6 per cent of caffeine; tea, from 2 to 4 per cent. Even moderate amounts of caffeine have the effect of stimulating one mentally by increasing the circulation; large doses cause insomnia, rise of temperature and paralysis of heart action. For these reasons excessive indulgence in tea or coffee is injurious.

CAGLIARI, *ka lyah're*, the capital of Sardinia, is situated on the southern coast of the island, 268 miles from Naples. It is said to have been founded by the Phoenicians. The place contains a cathedral, about thirty churches, an amphitheater, botanical gardens, theaters, a university which was founded by Philip II of Spain in 1596, and a library which contains over 70,000 volumes. The chief manufactures are firearms, powder, soap, leather and cotton goods. The exports are grain, wine, oil, salt and goatskins. Cagliari is the emporium through which nearly all the trade of Sardinia passes. Population of city and suburbs, census of 1931, 101,878.

CAIAPHAS, *ka'ya fas*, a Jew, the high priest at the time of the crucifixion. He was deposed A. D. 35, and Jonathan, the son of Annas, was appointed in his stead. (*Matt.* XXVI, 57).

CAIN, *kane*, the eldest son of Adam and Eve and brother of Abel. His story is related in *Genesis* IV. Because the Lord "had respect for" the offerings of Abel, and none for those of Cain, the latter killed his brother in a fit of jealous anger. As a punishment he was forced to become a wanderer, and that he might not be slain the Lord placed a mark upon him. The "mark of Cain" has come to be a well-known figure of speech.

CAINE, THOMAS HENRY HALL, Sir (1853-1931), an English novelist, who has won considerable popularity in England and America as the author of stories which have a special appeal because of their underlying gloom. He was born at Runcorn, England, and educated in the schools of the Isle of Man and Liverpool. Caine was educated to be an architect, but preferred journalism, and for six years was a leading writer on the Liverpool *Mercury*. On the invitation of Dante Rossetti, he went to London in 1881 and lived with Rossetti until the death of the latter in 1882. During the last year of the poet's life Caine prepared his *Recollections of Rossetti*. This was followed by his

Songs of Three Centuries, and the next year by *Cobwebs of Criticism*. After this, Caine began his career as a novelist. After 1885 he produced, among other books, *The Shadow of a Crime*, *The Son of Hagar*, *The Deemster*, *The Bondman*, *The Manxman*, *The Christian*, *The Eternal City*, *The White Prophet* and *The Woman Thou Gavest Me*. Several of his novels have been dramatized. In 1916 he published a play, *Margaret Schiller*, which was produced in New York, and in 1921 appeared *The Master of Man*. He was knighted in 1918.

CAIRN, a heap of stones built up over a grave, or serving as a landmark. These heaps are very common in Great Britain, particularly in Scotland and Wales, where they are generally of a conical form. Some are evidently sepulchral, containing urns, stone chests or bones; some were evidently erected to commemorate some great event, while others appear to have had a religious significance. A religious or mystical meaning still attaches to the building of cairns among many primitive tribes, and they are usually erected, not all at one time, but by the efforts of passers-by, each of whom adds a stone to show his interest in the object for which the heap was begun.

CAIRO, *ki'ro*, EGYPT, the capital of the country and the largest city in Africa, called by the Arabs *Misr-el-Kahira*, is over 1,300 years old. It was founded by Amru, a savage conqueror of Egypt, in the year 640. Cairo is the delight of winter tourists, who flock to it by thousands every year, for here East and West meet, and the cosmopolitan atmosphere of the place presents an ever-changing panorama. Afghans, Arabs, Berbers and a score of other tribes afford a scene of coloring and confusion of tongues that is not found elsewhere in Europe or Africa on a like scale.

Cairo is on the River Nile, 150 miles from the Mediterranean Sea at Alexandria, and eighty miles west of Suez. Parts of an ancient wall still stand and several well-defined sections, the result of growth through the centuries and the separation of nationalities, are clearly evident.

The old Arabian quarter has narrow, crooked, unpaved streets, lined with high stone houses. The modern portion has such conveniences as gas-lighting and electric street railways, and has broad avenues and beautiful buildings. Among the chief inter-

ests of Cairo are the numerous mosques, which are considered the best examples of Arabic architecture. The Gami-ibn-Tulun erected about 879, is the finest, and the Gami-Amra is the oldest. Of this, only a portion is left. Among other mosques are the Mehemet Ali, a structure of great merit, having high minarets of alabaster, and the mosque of Kait Bey, dating from the fifteenth century. Cairo formerly had many obelisks, but most of these have disappeared and are now in various European and American cities.

Cairo ranks high as an Oriental educational center, among its institutions the most important being the El-Azhar, considered the oldest university in the world. Besides these, there are schools of art and medicine, a polytechnical school and a library. The city is the seat of administration of Egypt. The trade is large, and the bazaars and markets are numerous. The manufactures include metal articles, textiles and essences of flowers. Through the Middle Ages the city was one of the chief centers of Mohammedan learning, and the center of trade between Europe and the East. From 1798 to 1801 it was held by the French, later passed to the Turks and through them to Mehemet Ali, the founder of the present dynasty, which under the British, rules the country. Population, 1927, 1,064,000.

CAIRO, *ka'ro*, ILL., at the southernmost point in Illinois, at the junction of the Ohio and Mississippi rivers, is the county seat of Alexander County. It is 364 miles from Chicago and 148 miles from Saint Louis. The city is protected from the frequent floods on the two rivers by an almost perfect system of stone and concrete levees and walls. Four railroads enter the city—the Illinois Central, the Mobile & Ohio, the New York Central, and the Missouri Pacific. The water commerce is largely in general merchandise, lumber and coal. Woodworking factories and cottonseed products lead in industrial enterprises; there is a harness factory. There is a Federal building, a fine library, the Safford Memorial, and there is one hospital. A state armory is here. The commission form of government was adopted in 1913. Population, 1920, 15,203; in 1930, 13,532, a loss of 13 per cent.

CAISSON, *kase'son*, in civil engineering, a water-tight box, or casing, used in building structures in water too deep for the cofferdam, such as piers of bridges and

quays. The caisson is sunk to the bottom of the river and is large enough to contain the entire structure to be built within it. The pneumatic caisson is an air-tight chamber, sunk to the bed of the stream and entered through an air lock. Ventilation is secured by air pumps. The term *caisson* is sometimes applied to floating docks. See Dock.

CAISSON, *kase'son*, the ammunition wagon attached to a piece of field artillery. The term is used in two ways. It may refer to a two-wheeled vehicle carrying one ammunition chest with a capacity of seventy rounds; and it may signify a four-wheeled vehicle consisting of the caisson body and the *limber*, or forepart, to which the horses are attached. The limber may be detached and fastened to a gun.

CAL'ABAR BEAN, the seed of an African plant, nearly allied to the kidney bean. It is so powerful a narcotic poison that six beans will produce death. The calabar bean



CALABAR BEAN

is the famous "ordeal bean" of Africa, administered to persons suspected of witchcraft. If the accused vomits the bean and recovers, it is a sign of innocence. It is employed in medicine, chiefly as an agent for producing contraction of the pupil of the eye, and in the treatment of neuralgia, lock-jaw and rheumatism.

CALABASH, *ka'la bash*, a gourd somewhat similar to the crookneck species of squash, and cultivated in the same way. Its shell is smooth and so hard that, cut in two parts, it was once used largely for dippers and various vessels for holding liquids.

The *Calabash pipe*, so much sought by smokers, is made from the neck of the calabash of the crookneck variety. The first pipe of this nature was made by a British soldier in the South African War, by the addition of a pipestem from a broken brier pipe. It is claimed that the calabash makes the mildest and coolest smoke to be obtained from pipes of any description. Some of these pipes are expensive.

CALAIS, *ka la'*, FRANCE, the nearest French port to England, opposite Dover, and distant from it twenty-one miles across the English Channel. For six hundred years it has been in the path of armies and the object of sieges; medieval bows and arrows and modern long range guns have alike been trained on it. It was a much-coveted objective of the German high command in the World War, and although the concussion from the great guns shook the town, it was practically undamaged.

In 1347 the English captured Calais, after a siege of eleven months by the armies of Edward III; the queen's entreaties saved her people, but they were expelled to give possession to the victors, who retained the place for about 200 years. In 1558 the Duke of Guise drove the English away, and it has since been French. A project to build a tunnel between Dover and Calais was abandoned soon after 1900, through mutual fears of the advantage either country might gain in case of war. In 1914 it was sadly needed.

Calais was one of the most important ports connecting English and French interests in the World War. It reached out by rail to the English-French-American system of defenses and of operations in Northern France, and millions of tons of munitions and millions of English soldiers passed through it during the war. It is a manufacturing town, and has large shipyards, but its greatest fame arises from its position as a landing place in France for tourists from the British Isles. Population, 1931, 70,215.

CAL'AMINT, a genus of plants, some species of which are known respectively by the names of mountain balm, catmint, basil

balm and wild basil. The first, also termed common calamint, has aromatic leaves, employed to make herb tea.

CALAMUS, a genus of plants, the stems of the different species of which are the rattan canes of commerce. The genus holds a middle station between the grasses and palms, growing like the former but with flowers like the latter. The species are principally found in the hotter parts of the East Indies. See SWEET FLAG.

CALCEOLARIA, *kal se o la're ah*, or **SLIPPERWORT**, a genus of ornamental plants. All the species are South American, but they are extensively cultivated in North America as garden shrubs or as house plants in pots. Most of them have yellow flowers, some have brownish-purple ones and some have the two colors intermixed, while others are white. The greater number in cultivation are hybrids and not true species. They get their name from the shape of the corolla, which resembles a broad, short, much inflated slipper.

CALCIMINE, *kal'si mine*, a compound of carbonate of lime, or whiting, and some sticky substance such as sizing glue or casein. A variant of the word is *Kalsomine*, but it has no standing. It is one of the commonest substances used in decorating walls and ceilings of houses, and may be procured white or in colors. Whitewash, made from caustic lime, is an entirely different substance.

The following directions for making calcimine have the approval of the United States Department of Agriculture:

Take 16 pounds of dry Paris white (whiting), and pulverize till free of lumps, then mix with one gallon of boiling water. To this add one-half pound of white sizing glue after it has soaked for four hours in one-eighth gallon of cold water. The glue should be dissolved in a glue pot. Any tint desired may be given the calcimine by stirring liquid coloring into the stock. The above recipe will make about two gallons of calcimine weighing 12½ pounds per gallon. It may be used at once, but is better after standing for half an hour. Ocher, cochineal and logwood are the materials usually used for tinting.

CALCINATION, *kal se na'shun*, the operation of roasting a substance or subjecting it to heat, generally with the purpose of driving off some volatile ingredients. It is the first step in the extraction of the majority of the common metals from their ores. In the manufacture of lime and cement, calcination is an essential process. The term was

formerly also applied to the operation of converting a metal into an oxide or metallic calx; this is now called *oxidation*.

CALCITE, *kal'site*, a term applied to various minerals, all of which are modifications of crystallized carbonate of calcium. Calcite includes limestone, all the white and most of the colored marbles, chalk and Iceland spar.

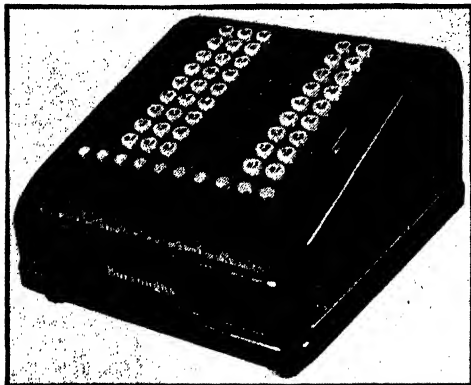
CALCIUM, *kal'se um*, in its pure state one of the rarest of substances, but in its combinations one of the most abundant and most widely distributed. It is a metallic basis of lime, and as a phosphate it forms the main part of the mineral matter of the bones of animals. As a carbonate it appears in chalk, limestone and marble, and as a sulphate it forms large deposits known as gypsum. Besides, it appears as a constituent in many minerals, such as fluorspar and Iceland spar, and is found in all soils, in the ash of plants, dissolved in sea water and in all springs. When quite pure it is a pale yellow metal with a high luster. It is about one and a half times as heavy as water, and is ductile and malleable. For the most part its salts are insoluble, or sparingly soluble, in water, but they dissolve readily in dilute acids.

CALCIUM CARBIDE, a compound of calcium and carbon, used extensively in making acetylene gas (which see). It is a hard, brittle solid, dark gray in color and of a crystalline structure. When first broken it shows a lustrous surface, but exposure to the air causes it to tarnish quickly. Calcium carbide was first discovered by Edmund Davy in 1836, but its commercial production on a large scale dates from 1894, when a new method was devised by a Canadian engineer, Thomas L. Willson.

CALCULATING MACHINES, also called **ADDING MACHINES**, are machines for performing various arithmetical operations. They have become essential in every well-conducted business, even to that of the small retail merchant. The latter class of business man particularly desires that form of calculating machine known as the cash register (which see).

Calculating machines are of many patterns. The simplest form is the register used on street cars. This contains a number of wheels, each of which bears the ten figures used in reckoning. When the cord which operates the register is pulled, the wheel representing units moves so as to mark the

number next higher than the one previously registered. In making a complete revolution, this wheel registers the 10 unit marks. At this point the second wheel is moved to mark 1. When the second wheel has marked



ADDING MACHINE

10, which would mean 100 for the first wheel, the third wheel marks 1, and so on.

Calculating machines used in banks, insurance offices and other places where computations are extensive, have a keyboard arranged something like that of a typewriter. The keys are arranged so that the numbers stand in columns from 1 to 9. When any key is pressed, it marks that figure upon a slip of paper. As many keys as the machine has columns can be pressed at once. The pressing of another key gives the result of additions or subtractions, and some machines have arrangements which will also give multiplications and divisions.

In many retail food markets we find a further extension of the principle in the use of scales which not only weigh a purchase, but also register the full amount of the purchase in dollars and cents, at whatever price is indicated.

CALCULUS, *kal'kulus*, the highest branch of mathematics. Its field is the investigation of the properties of variable quantities and especially of their rate of change. The following is a problem in calculus:

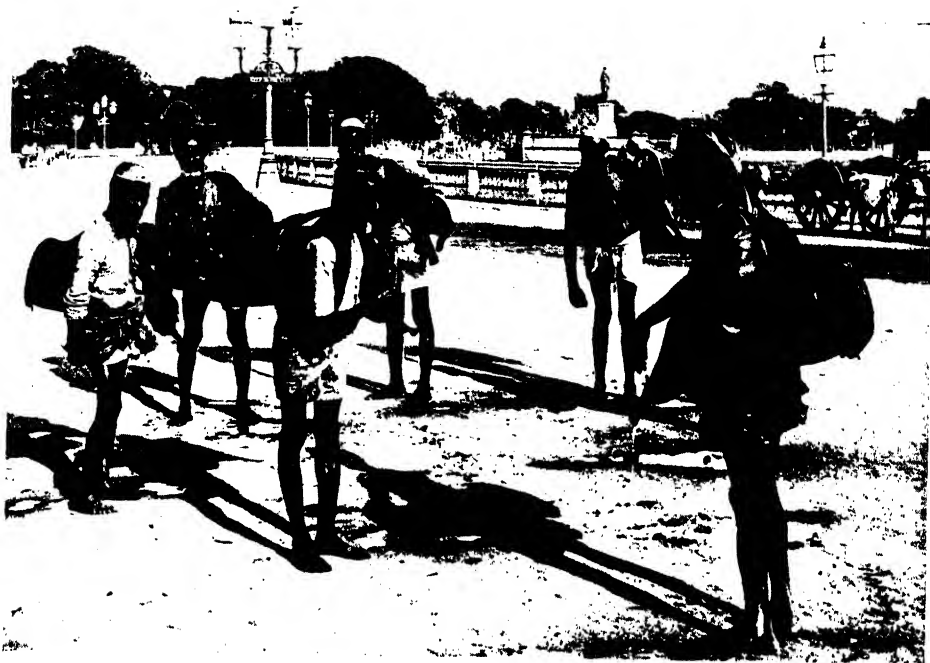
A man in a boat eight miles from the nearest point on a straight shore wishes to reach a point ten miles away from that point. He rows at the rate of four miles an hour and walks at the rate of five miles an hour. Where should he land in order to reach his destination in the shortest possible time?

CALCULUS, in medicine, a general term for the stony formations which appear in various parts of the body, such as the bladder, the kidneys or the gall bladder. When the particles in the bladder are comparatively small, the disease is known as gravel. See **LITHOTOMY**.

CALCUTTA, *kalkut'ah*, INDIA, the metropolis of British India and capital of the presidency of Bengal, situated on the Hugli River, a branch of the Ganges, eighty-six miles from the sea. In population it is second to London among the cities of the British Empire, and until 1912 it was the seat of government of the Indian Empire. The city extends along the river bank for several miles, and is surrounded by populous suburbs, which include the large town of Howrah, on the opposite side of the Hugli, connected with Calcutta by a floating bridge 1,530 feet long. The houses of the south, or British, quarter of Calcutta are of brick and are well built, in striking contrast with those on the narrow, crooked ill-kept streets of the northern quarter, which is occupied by the natives.

Outside the city, between the river and the fashionable quarter, lies Fort William, the largest fortress in India, a magnificent octagonal structure, which cost altogether \$10,000,000, mounts over 600 guns, contains 80,000 stands of arms and will hold 15,000 men. The plain between Fort William and the city forms a favorite promenade. At the north side, called the Esplanade, stands the former residence of the viceroy of India, or palace of the governor-general, now occupied by the Governor of Bengal and called Government House. Other edifices worthy of note are the Victoria Memorial, the town hall, the High Court building, the Royal Exchange, and Belvedere House and Hastings House, former homes of Warren Hastings. Here is located the University of Calcutta and a number of affiliated institutions.

This river port claims to handle the largest volume of trade of any city in India: it is the natural outlet for that wealth of river-borne trade that comes down the Ganges and the Brahmaputra. It gives anchorage to vessels 30 feet in draft. The principal exports are opium, cotton, rice, wheat, jute, gunny bags, tea, indigo, seeds and raw silk. Of the imports the most important are machinery, textiles, salt and liquor.



Underwood & Underwood

CALCUTTA, INDIA

Above: Water carriers with leather bottles, in a public square.

Below: Teeming boat life in the port; river craft laden with products from the interior. Ocean-going steamers in the background.

PERPETUAL CALENDAR

For ascertaining any day of the week for any given time within two hundred years from the introduction of the New Style, *1752 to 1952, inclusive.

YEARS 1753 TO 1952										Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	
1761 1801	1767 1807	1778 1818	1789 1829	1795 1835	1846	1857 1903	1863 1914	1874 1925	1885 1931	1891 1942	4	7	7	3	5	1	3	6	2	4	7
1762 1802	1773 1813	1779 1819	1790 1830	1841	1847	1858 1909	1869 1915	1875 1926	1886 1937	1897 1943	5	1	1	4	6	2	4	7	3	5	1
1757 1803	1763 1814	1774 1825	1785 1831	1791 1842	1853	1859 1910	1870 1921	1881 1927	1887 1938	1898 1949	6	2	2	5	7	3	5	1	4	6	2
1754 1805	1765 1811	1771 1822	1782 1833	1793 1839	1799 1850 1901	1861 1907	1867 1918	1878 1929	1889 1935	1895 1946	2	5	5	1	3	6	1	4	7	2	5
1755 1806	1766 1817	1777 1823	1783 1834	1794 1845	1800 1851 1902	1862 1913	1873 1919	1879 1930	1890 1941	1947	3	6	6	2	4	7	2	5	1	3	6
1758 1809	1769 1815	1775 1826	1786 1837	1797 1843	1854 1905	1865 1911	1871 1922	1882 1933	1893 1939	1899 1950	7	3	3	6	1	4	6	2	5	7	3
1753 1810	1759 1821	1770 1827	1781 1838	1787 1849	1798 1855	1866 1906	1877 1917	1883 1923	1894 1934	1900 1945 1951	1	4	4	7	2	5	7	3	6	1	4

LEAP YEARS										29										
1764	1792	1804	1832	1860	1888	1928	.....			7	3	4	7	2	5	7	3	6	1	4
1768	1796	1808	1836	1864	1892	1904	1932			5	1	2	5	7	3	5	1	4	6	2
1772	.....	1812	1840	1868	1896	1908	1936			3	6	7	3	5	1	3	6	2	4	7
1776	.....	1816	1844	1872	.....	1912	1940			1	4	5	1	3	6	1	4	7	2	5
1780	.....	1820	1848	1876	.....	1916	1944			6	2	3	6	1	4	6	2	5	7	3
1756	1784	1824	1852	1880	.....	1920	1948			4	7	1	4	6	2	4	7	3	5	1
1760	1788	1828	1856	1884	.....	1924	1952			2	5	6	2	4	7	2	5	1	3	6

1	2	3	4	5	6	7
Monday . . . 1	Tuesday . . . 1	Wednesday . . . 1	Thursday . . . 1	Friday . . . 1	Saturday . . . 1	SUNDAY . . . 1
Tuesday . . . 2	Wednesday . . . 2	Thursday . . . 2	Friday . . . 2	Saturday . . . 2	SUNDAY . . . 2	Monday . . . 2
Wednesday . . . 3	Thursday . . . 3	Friday . . . 3	Saturday . . . 3	SUNDAY . . . 3	Monday . . . 3	Tuesday . . . 3
Thursday . . . 4	Friday . . . 4	Saturday . . . 4	SUNDAY . . . 4	Monday . . . 4	Tuesday . . . 4	Wednesday . . . 4
Friday . . . 5	Saturday . . . 5	SUNDAY . . . 5	Monday . . . 5	Tuesday . . . 5	Wednesday . . . 5	Thursday . . . 5
Saturday . . . 6	SUNDAY . . . 6	Monday . . . 6	Tuesday . . . 6	Wednesday . . . 6	Thursday . . . 6	Friday . . . 6
SUNDAY . . . 7	Monday . . . 7	Tuesday . . . 7	Wednesday . . . 7	Thursday . . . 7	Friday . . . 7	Saturday . . . 7
Monday . . . 8	Tuesday . . . 8	Wednesday . . . 8	Thursday . . . 8	Friday . . . 8	Saturday . . . 8	SUNDAY . . . 8
Tuesday . . . 9	Wednesday . . . 9	Thursday . . . 9	Friday . . . 9	Saturday . . . 9	SUNDAY . . . 9	Monday . . . 9
Wednesday . . . 10	Thursday . . . 10	Friday . . . 10	Saturday . . . 10	SUNDAY . . . 10	Monday . . . 10	Tuesday . . . 10
Thursday . . . 11	Friday . . . 11	Saturday . . . 11	SUNDAY . . . 11	Monday . . . 11	Tuesday . . . 11	Wednesday . . . 11
Friday . . . 12	Saturday . . . 12	SUNDAY . . . 12	Monday . . . 12	Tuesday . . . 12	Wednesday . . . 12	Thursday . . . 12
Saturday . . . 13	SUNDAY . . . 13	Monday . . . 13	Tuesday . . . 13	Wednesday . . . 13	Thursday . . . 13	Friday . . . 13
SUNDAY . . . 14	Monday . . . 14	Tuesday . . . 14	Wednesday . . . 14	Thursday . . . 14	Friday . . . 14	Saturday . . . 14
Monday . . . 15	Tuesday . . . 15	Wednesday . . . 15	Thursday . . . 15	Friday . . . 15	Saturday . . . 15	SUNDAY . . . 15
Tuesday . . . 16	Wednesday . . . 16	Thursday . . . 16	Friday . . . 16	Saturday . . . 16	SUNDAY . . . 16	Monday . . . 16
Wednesday . . . 17	Thursday . . . 17	Friday . . . 17	Saturday . . . 17	SUNDAY . . . 17	Monday . . . 17	Tuesday . . . 17
Thursday . . . 18	Friday . . . 18	Saturday . . . 18	SUNDAY . . . 18	Monday . . . 18	Tuesday . . . 18	Wednesday . . . 18
Friday . . . 19	Saturday . . . 19	SUNDAY . . . 19	Monday . . . 19	Tuesday . . . 19	Wednesday . . . 19	Thursday . . . 19
Saturday . . . 20	SUNDAY . . . 20	Monday . . . 20	Tuesday . . . 20	Wednesday . . . 20	Thursday . . . 20	Friday . . . 20
SUNDAY . . . 21	Monday . . . 21	Tuesday . . . 21	Wednesday . . . 21	Thursday . . . 21	Friday . . . 21	Saturday . . . 21
Monday . . . 22	Tuesday . . . 22	Wednesday . . . 22	Thursday . . . 22	Friday . . . 22	Saturday . . . 22	SUNDAY . . . 22
Tuesday . . . 23	Wednesday . . . 23	Thursday . . . 23	Friday . . . 23	Saturday . . . 23	SUNDAY . . . 23	Monday . . . 23
Wednesday . . . 24	Thursday . . . 24	Friday . . . 24	Saturday . . . 24	SUNDAY . . . 24	Monday . . . 24	Tuesday . . . 24
Thursday . . . 25	Friday . . . 25	Saturday . . . 25	SUNDAY . . . 25	Monday . . . 25	Tuesday . . . 25	Wednesday . . . 25
Friday . . . 26	Saturday . . . 26	Monday . . . 26	Tuesday . . . 26	Wednesday . . . 26	Thursday . . . 26	Friday . . . 26
Saturday . . . 27	SUNDAY . . . 27	Monday . . . 27	Tuesday . . . 27	Wednesday . . . 27	Thursday . . . 27	Friday . . . 27
SUNDAY . . . 28	Monday . . . 28	Tuesday . . . 28	Wednesday . . . 28	Thursday . . . 28	Friday . . . 28	Saturday . . . 28
Monday . . . 29	Tuesday . . . 29	Wednesday . . . 29	Thursday . . . 29	Friday . . . 29	Saturday . . . 29	SUNDAY . . . 29
Tuesday . . . 30	Wednesday . . . 30	Thursday . . . 30	Friday . . . 30	Saturday . . . 30	SUNDAY . . . 30	Monday . . . 30
Wednesday . . . 31	Thursday . . . 31	Friday . . . 31	Saturday . . . 31	SUNDAY . . . 31	Monday . . . 31	Tuesday . . . 31

Note To ascertain any day of the week first look in the table for the year required and under the months are figures which refer to the corresponding figures at the head of the columns of days below. For example: To know on what day of the week July 4 was in the year 1895, in the table of

years look for 1895, and in a parallel line, under July, is ure 1, which directs to column 1, in which it will be s that July 4 falls on Thursday.

*1752 same as 1772 from Jan. 1 to Sept. 2. From Sept to Dec 31 same as 1780 (Sept. 3-13 were omitted).

In 1686 a factory of the East India Company was established here, and in 1700 three adjoining villages were presented to the company by the emperor of Delhi. The settlement was then fortified and was called Fort William, in honor of the king of England, but subsequently it received its present name, which had been that of one of the villages. Calcutta was made the capital of a presidency in 1707, but it first figures in history in connection with the events of 1756. In that year it was attacked suddenly, and taken on June 20 by Surajah Dowlah, then nabob of Bengal. The 156 white men of the garrison were imprisoned in the famous Black Hole, and nearly all lost their lives through suffocation (see BLACK HOLE OF CALCUTTA). Eight months later Clive and Admiral Watson recaptured Calcutta, which soon afterward entered on its modern career of prosperity. The town became the general seat of government of British India in 1773, but in 1912 the British government removed the capital to Delhi, the original capital. Population, 1931, including suburbs, 1,419,321.

CALEDONIA, the name by which the northern portion of Scotland and its inhabitants first became known to the Romans, when in the year 80 Agricola occupied the country up to the line of the Firths of Clyde and Forth. He defeated the Caledonians in 83, and again at Mons Grampius in 84, in a battle of which a detailed description is given by Tacitus. The Caledonians became the Scots and Picts of early English and Scotch history. The name Caledonia is often used for Scotland as a whole, as in Scott's invocation to Scotland in the *Lay of the Last Minstrel*.

CALEDONIAN CANAL, a waterway passing through Glenmore, or the Great Glen, of Scotland, connecting the Irish Sea and the North Sea. It consists of a chain of lakes and artificial canals joining them, the latter having an aggregate length of twenty-three miles. There are twenty-eight locks, eight of which constitute a series near the western terminal. These are known as "Neptune's Staircase." The canal is navigable for ships of 600 tons and less, and is chiefly used by summer excursion boats and fishing craft.

CALENDAR, a record or register showing the division of time into years, months, weeks and days. The name is derived from the word *calends* (or *kalends*), which was the

first day of the Roman month (see **KALENDS**). On this day it was the custom among the Romans for the *pontifex maximus* to call out or proclaim the month and the festivals to be observed during the month. The first division of time resulted from the regular occurrence of certain phenomena of nature; for instance, the changes of the moon suggested the division into months, making the months of twenty-nine or thirty days' time. Then the regular motion of the sun and the occurrence of the seasons divided time into years. The division into weeks, the only division not based on natural causes, was based on the observation of the law of Moses, which decrees the seventh day as the day of rest.

The year of the Jews consisted of twelve lunar months, with the thirteenth month inserted, when necessary, in order to accommodate it to the sun and the seasons. The Greek year had twelve lunar months of thirty and twenty-nine days, alternately. This made the year have 354 days, but a change was made later by which a month of thirty or twenty-nine days was introduced every other year. Still later another change was made by which the intercalary month was omitted once in about every eight years, making the average year have 365½ days. The Greek month was divided into three decades of ten days each.

The Romans divided their year into ten months, but in the course of time this was changed to twelve months, making 355 days, and an intercalary month was sometimes introduced. The general confusion of this calculation led Julius Caesar to remedy the arrangement by the use of the Julian calendar, in which the year has 365 days and every fourth year, or leap year, 366 days, making the average year have 365½ days. This calendar remained in use among the Romans until 1582, when it was found that the vernal equinox took place ten days earlier than its date in the calendar. Pope Gregory XIII remedied this error of time in the Gregorian, or Reformed, calendar, the one which is in use to-day. Pope Gregory ordained that ten days be subtracted from the year 1582, and every hundredth year, as 1600, 1700 and 1800, should be a common year and not a leap year, as in the old calendar, but every fourth hundred, as 2000, 2400, 2800 and so on, should be a leap year. The new calendar was adopted in Spain, Portugal, Italy and

France, and the other countries, Switzerland, Germany, the Netherlands, Poland, Hungary, Holland and Denmark, followed in succession. It was not until 1752 that the Gregorian calendar was adopted in England, with the commencement of the year set on January first. Sweden followed England in 1753. Those countries following the communion of the Greek Church retained the Julian calendar until the twentieth century. Greece and Russia now use the Gregorian calendar.

A Change Discussed. In 1916 a movement was started in the United States for an official change in the calendar for the purpose of increasing industrial efficiency. The proposed changes would do away with the confusion over varying numbers of days in different months and the constant changes of calendars. A year of thirteen months was proposed, with twenty-eight days to the month. All months would begin on Sunday, and between the end of one year and the beginning of the next one there would be an extra day, always to be a holiday. On leap years there would be two extra days—that is, the one between the years, and another one, coming in the middle of a wholly new month. This new month would fall between June and July. Holidays would fall next to Sundays, or else on Wednesdays, and Easter day would occur always on April 15.

Perpetual Calendar. See table facing page 637.

CALGARY, *kal'ga ri*, ALBERTA, one of the most important and flourishing cities of the province, second to Edmonton, the provincial capital, in population. The two cities are the largest Canadian cities between Winnipeg and Vancouver. The town was founded in 1876, and named for an estate in Scotland; the word means *clear running water*. It is nearly surrounded by the Bow and Elbow rivers. In 1901 the population of Calgary was only 4,392; ten years later it was 43,704; the dominion census of 1936 gave it 83,304 people, placing it among the ten largest cities of the Dominion. The population is largely Canadian and American.

Calgary is 194 miles south of Edmonton, 811 miles east of Victoria, B. C., 860 miles west of Winnipeg, and 1,215 miles north-west of Duluth, Minn. The two great trans-continental railroads of Canada—the Canadian Pacific and the Canadian National Railway, with their numerous branch lines radiating in all directions, serve the city.

The railroads maintain large repair shops here.

The industries are extensive and varied; chief among them are meat packing, milling, leather manufacture, planing mills, brick and tile yards, carriage and wagon works and foundries. The banks have over twenty branches. There are thirty-four public schools, six separate schools, six high schools, two colleges, a provincial Normal School and a School of Technology. The *Herald* block, the Hudson's Bay Stores, and the Palliser Hotel are important and attractive structures.

Calgary is ideally located as a manufacturing and industrial center. It has within a radius of a few miles a sufficient supply of anthracite, bituminous and lignite coal, also an abundant natural gas supply, to supply cheap power for many years to come. The marvelous growth of the Canadian West furnishes the manufacturer with a large market in which to dispose of his wares. The city is also one of the distributing centers of 165,000 square miles of the richest and most productive soil in America. The surrounding district produces grain and grasses, and sustains horses, beef and dairy cattle, sheep and hogs.

The commission form of government was adopted in 1909. The city owns its street railways, light and power plants, water-works, a municipal market and a municipal paving plant. There are ten parks, the largest, Victoria Park, containing 103 acres.

CALHOUN, *kal'hoon'*, JOHN CALDWELL (1782-1850), an American statesman who was a great national figure during that notable period in which Clay and Webster also rose to fame. This renowned trio of orators were the master minds of American political history for two score years, and more. Webster was the spokesman for the North and for union; Clay was the advocate of compromise; Calhoun sturdily upheld the cause of states' rights which he maintained until his death. He was born on a farm near Abbeville, in the uplands of South Carolina, of Scotch-Irish descent. His father, Patrick Calhoun, a man of intelligence, sent John to the academy of his son-in-law, Moses Waddel, in Georgia. The elder Calhoun died in 1796 and his son's education was interrupted for a time, but by arduous study and the encouragement of Waddel, he was able to enter Yale College as junior in 1802, and he

was graduated with high honors in 1804. After a brief career as a lawyer in Abbeville, S. C., he was elected to Congress in 1811, and there became conspicuous as both orator and statesman. At first he was a warm follower of Henry Clay and was a strong nationalist in his views, favoring a powerful navy, the United States bank and a protective tariff. In 1817 he was made Secretary of War and displayed remarkable ability.

Calhoun was elected Vice-President with John Quincy Adams in 1824, but during this administration his views gradually changed, and he was elected Vice-President with the radical Democrat, Andrew Jackson, in 1828. In this year also he became a prominent opponent of the protective tariff, as a representative of the agricultural states of the South, and prepared a famous paper affirming the right of a state to refuse to submit to any law of Congress which it considered unconstitutional. This led to a separation of interest between Calhoun and Jackson, which became constantly more marked until it culminated in the open contest over nullification in 1833. Calhoun urged nullification as a state right; Jackson took the opposite view, and by a firm and prompt display of Federal authority he succeeded in putting down the sentiment both for secession and for civil war.

For the rest of his life Calhoun was a powerful advocate of states' rights and, incidentally, of slavery, for it was upon the question of slavery, chiefly, that the states found themselves at odds with the Federal government. As a member of the Senate from 1832 to 1843 he supported President Van Buren's subtreasury scheme, denounced the tariff of 1842 and supported the Webster-Ashburton Treaty. In 1844 he was appointed Secretary of State by President Tyler, and was partly responsible for the annexation of Texas and indirectly for the Mexican War, though he opposed the latter. He again entered the Senate in 1845, and from that time on he was prominent chiefly as an ardent advocate of slavery and the Southern cause. His last speech was in favor of the Compromise of 1850, but it was read, on account of his illness, by a colleague.

During his last months Calhoun wrote his famous *Disquisition on Government* and his *Discourse on the Constitution and Govern-*

ment of the United States, remarkable discussions of constitutional questions. His personality, character and bearing were exceedingly attractive, and as orator and statesman he possessed abilities which have rarely been equaled in America, but he was led to advocate an impossible doctrine, namely, the construction of a powerful federal nation whose constituent states were practically independent.

CALICO, *kal'i ko*, AND CALICO PRINTING. By *calico* is meant any inexpensive cotton fabric having designs stamped in color. A distinctive name is given to certain varieties of calico, such as percale and cretonne, but these fabrics come within the meaning of the definition given.

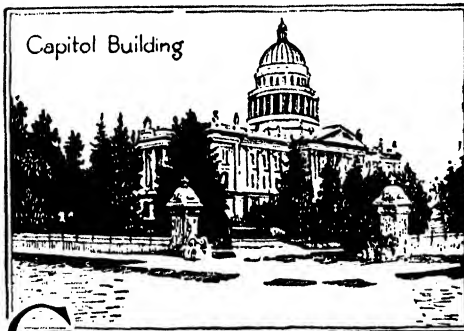
Calico Printing, the name given the process of stamping the patterns on the cloth. Originally the patterns were carved on blocks of wood, which were laid on the cloth by hand. Each block contained the portion of the figure which impressed a single color, and great care was necessary in laying on the blocks, so as not to mar the pattern.

Calico printing is now done by a printing press which in its general plan and structure somewhat resembles the cylinder press used for printing paper. The important parts of this press are a large cylinder, or drum, around which the cloth passes, and several smaller copper cylinders upon which the pattern is engraved, and which are so placed that as the cloth passes around the drum, the portion of the pattern upon each cylinder is impressed upon the cloth. Each of the engraved cylinders is supplied with coloring matter by contact with a wooden cylinder covered with cloth and dipping into a trough containing the dye.

The figures are engraved upon the cylinder either by pressing them against a cylinder of hard steel, upon which the pattern is cut in raised figures forming dies, or by etching with acid. By either process the pattern is sunk into the surface of the engraved cylinder. When brought in contact with the dye, the figures are filled with the substance, and a steel plate called the *color doctor* presses against the surface and removes all dye except that in the sunken figures forming the patterns. As the cloth is pressed against the cylinder it absorbs the dye from these figures and thus has the pattern stamped upon it. Each color or tint requires a separate cylinder, and, by increasing the size of the drum,

as many as twenty colors can be used at a time. The engraved cylinders are so adjusted that the different parts of the pattern will fit to one another.

Calico printing is done by three methods, known as *direct printing*, *combined printing and dyeing* and *discharge and reserve* methods. By the first method, the pattern is stamped directly upon the cloth in the colors which it is intended to contain. This method is now but little used, because the goods printed by it fade quickly. The combined printing and dyeing method makes use of mordants (see DYEING) and is subject to a great many variations. It is based upon the principle that the same dye, when treated with different mordants, will produce different colors. By this method the mordants are stamped upon the cloth, and it is then dipped in a dye, after which the colors are fixed by exposure to air or to steam heat. This method produces what are known as *fast colors*, that is, colors that will not fade. The discharge and reserve method consists in treating the cloth so that certain portions of it are white when the process is completed. This is done either by stamping upon the cloth some substance, such as clay or wax, that the color will not penetrate, or by stamping upon certain parts of the figure a substance which, when moistened, will dissolve the color. Most of the patterns in blue and white are printed in this way.



CALIFORNIA, popularly called **THE GOLDEN STATE**, is the largest of the Pacific commonwealths and the second largest state in the Union. With an area of 158,297 square miles it is surpassed by Texas alone. California is so large that it could contain almost 127 states the size of Rhode Island; of its entire area, all but 2,645 square miles constitute land surface. The state lies along

the Pacific coast from Oregon to Lower California. It is irregularly oblong in shape, and is over three times as long as it is wide. With a north and south length of 780 miles it is the longest state in the Union with the exception of Texas; its coast line of more than 1,000 miles is very nearly equal to that of Florida. California ranked sixth among the states in 1930, with a population of 5,677,251. This figure represents an increase of 65.5 per cent during the preceding decade, and it is conservatively estimated that the population continues to swell at the rate of 125,000 persons per year.

Probably no American commonwealth overshadows the Golden State in interest and popularity. Its picturesque and thrilling history, the balmy climate of its valleys, its towering, forest-covered Sierra Nevada Mountains, its wealth of fruits, flowers and mineral resources—all of these features have given California a very definite place in the mind and heart of the average American.

The name "Golden State" refers to the historic discovery of gold in 1848, but there is much of romantic association in the name, as well. The name, *California*, is said to have been borrowed from a fabled island in the Pacific situated "on the right hand of the Indies and very close to the Earthly Paradise." It was peopled by women who lived like the Amazons. "Their arms were of gold; there was no metal but gold."

Surface and Drainage. The Sierra Nevada Mountains extend along the eastern boundary for nearly the entire length of the state, and west of these and nearly parallel with them is the Coast Range. At the north these ranges are connected by spurs of the Cascades, which contain a number of prominent peaks; among them is Mount Shasta, far-famed for its grandeur and beauty. At the south these ranges are connected by the Tehachapi Mountains and within this mountain enclosure is a large plain over 400 miles long with an area of about 18,000 square miles. There the surface is mostly level and the soil is fertile, making this plain one of the most valuable agricultural regions of the world. The plain is divided into the Sacramento and San Joaquin valleys, each being named from its respective river. Between the spurs of the Coast Range, the foothills and the Sierra Nevadas are numerous fertile valleys, sheltered from wind and fog. When supplied with water these valleys produce abundant

crops of semitropical fruits and vegetables, for which this part of the state is famous.

South of the Tehachapi Mountains is that part of the state usually known as Southern California. The region is more or less broken, but the mountains are not so high as those farther north. Near the southern boundary is one of the most remarkable depressions in the world, Death Valley, whose surface is in some places more than 400 feet below sea level. This valley was once the bed of a salt lake.

This blending of mountain, plain and valley gives to the scenery of California grandeur and beauty which must be seen to be appreciated. The state contains forty peaks between 5,000 and 8,000 feet in altitude, and eleven exceeding 14,000, while Mount Whitney, 14,502 feet, is the highest peak in the United States. Almost as lofty is Fisherman Peak, one of the lesser elevations of Mount Whitney, with an altitude of 14,448 feet. The best known and most famous peak is Mount Shasta, 14,380 feet. The western slope of the Sierra Nevadas contains many deep canyons in which are found rushing streams and beautiful cascades. Among these is Yosemite Valley, most famous because it is the most accessible, though it would have a number of rivals were they equally well known. Mountain lakes remarkable for the purity of their water are of frequent occurrence. Lake Tahoe, between California and Nevada, and a number of others surpass the famous Swiss lakes in beauty.

The great valley in the interior is drained by the San Joaquin and Sacramento rivers, which unite before they enter San Francisco Bay. Each of these is navigable for a considerable distance. Among the mountains and foothills are found numerous rapid streams, which are fed by melting snows and are used either for irrigation or for the production of electric power. West of the Coast Range the Salinas River drains the west-central portion of the state; in the north are the Klamath and the Eel.

Climate. The climate advantages of California are known to everyone who has heard the name of the state. For those who dislike extremes of heat and cold the greater part of the state is delightful throughout summer and winter. California extends from the latitude of Savannah, Ga., to that of Boston, Mass., but the climate is entirely different from that of the Eastern states in-

cluded between these parallels. The variations in temperature are due to altitude rather than latitude, and the climate in the northern end of the state is as mild and salubrious as in the southern. The great central valleys are so protected by the mountains that the same fruits grow in the north as in the south. Except upon the high elevations, live stock can remain out of doors throughout the year, and there is always sufficient grass for grazing. Roses and other flowers blossom the year 'round, and oranges, lemons and other semitropical fruits are raised in the valleys.

The high altitudes of the Sierra Nevadas have a cool climate, and the highest peaks of this range are covered with perpetual snow. Instead of being divided into winter and summer, the year is characterized by wet and dry seasons, the former lasting from October to April, and the latter occupying the remainder of the year. The rainfall varies in different localities. In the mountainous regions and in the San Joaquin and Sacramento valleys it is sufficient for nearly all agricultural purposes, though certain districts are greatly benefited by irrigation; but south of the Tehachapi Mountains the rainfall is very light and irrigation is necessary to successful tillage.

Minerals and Mining. Since the days of "49", a time when the entire world was stirred by rich discoveries of gold in the foothills of the high Sierras, the value of mineral production has dropped from first to third place and to a present relative value of about 18 per cent among the five basic industries of this commonwealth. The average annual income during prosperous years is about \$360,000,000. Gold far outstrips such other metals as quicksilver, silver, copper and lead, very largely because of the Federal revaluation of gold. Unlike the early days when gold led the field, petroleum (about 175,000,000 barrels annually) and natural gas now represent 80 per cent of the aggregate value of the mineral production (and yet 98 per cent of the metals produced is gold). There is also a shift in the regions which produce this form of wealth: the Los Angeles Basin, instead of the San Francisco region, yields most of the mineral products of the state.

In the structural groups cement and several kinds of building stones are leading items. Borax equals the value of salt and

soda combined; mineral water is an important product. Commercial operations in minerals are reported in 57 out of the 58 counties of the state.

Agriculture. Second in importance only to manufacturing is agriculture, which yields 30 per cent of the huge income of the state. For many years the annual income from agriculture averaged over \$600,000,000. This wealth is derived not only from the fertile valleys such as the Imperial, San Joaquin and Sacramento with the aid of a semi-tropical climate, but intensive irrigation enterprises are annually increasing the productivity of the soil. There are over 135,676 farms with a total of 30,442,581 acres of farm land, 16 per cent of which is under irrigation.

Oranges, grapefruit, lemons, apricots, grapes, prunes and walnuts, as a group, account for over one-half of the income from the land. Field crops such as wheat, barley, rice, beans, cotton, potatoes and hay produce one-third of the agricultural wealth; the remainder is derived from a large variety of vegetable crops such as asparagus, lettuce, melons, peas and tomatoes.

Stock-raising was almost the sole source of livelihood for the people before Americans took possession of California; and while nearly 200 million dollars are extracted annually from this industry, the supply of live stock remains practically stationary, in spite of a rapidly increasing population. Poultry raising is on the increase, but there has been a definite decrease in the number of horses.

Manufacturing. California's manufacturing establishments provide as much income for the state as is derived from agriculture and mining combined. There are more than 10,000 manufactories in the state; these are made possible through the presence of oil and through the vast development of hydro-electric power; their income has shown a yearly average of over \$1,000,000,000 annually. Manufactures have forged ahead because of a large home market resulting from the rapid increase of population, because of the long distance from other manufacturing centers, and because of the increased demand for petroleum products.

The refining of petroleum is California's greatest manufacturing industry; it accounts for one-fourth of all refining in the United States. The motion picture industry ranks second; more than 70 per cent of all Amer-

ican films are produced in the sunny environs of the city of Los Angeles (See MOVING PICTURES). In the canning and preserving of fruits, vegetables, and fish California leads the nation; canning ranks third in the state's industries. Numerous foods and particularly dairy and meat products are manufactured. The important wine industry which was almost extinguished during the period of national prohibition is again flourishing. In addition to these, printing and publishing, chemicals, iron and steel products, especially automobile parts, textiles and forest products go to make up the large income from manufacturing in California.

Lumbering and Fishing. The lumber industry ranks fourth as a source of income; however it has shown a falling off as compared with early boom years. In spite of this the returns from lumber remain substantial, bringing an average annual income of about \$60,000,000. The principal species cut, in order of volume, are Ponderosa Pine, Redwood, Sugar Pine, Douglas Fir, White Fir and Incense Cedar.

Fishing ranks fifth in the list of California's basic industries. Tuna, sturgeon, smelt, halibut, sole, mackerel, cod, bass, red snapper, sandabs and pompano are among the fish caught in the coast waters, while the mountain streams abound in trout and black bass. Of the shell fish, oysters, clams, mussels, crabs, shrimps and crawfish are taken in considerable volume.

Commerce and Transportation. Richard H. Dana prophetically remarked in his book *Two Years Before the Mast* that if "California ever becomes prosperous," San Francisco Bay "will be the center of its prosperity." This was well said for out of this bay, crossed by two of the largest suspension bridges in the world, and through the "Golden Gate" passes more than one-half of California's import and export trade.

The extent of her foreign trade varies from year to year, sometimes amounting to \$400,000,000 in a year. About one-half of California's specialty items find markets in foreign countries; such products are dried apricots and apples, canned pears and sardines, borax, kerosene and evaporated milk. Other items exported include barley, rice, grapes, raisins, asparagus, grapefruit, hops and petroleum.

Steam and electric railroad mileage approximates 12,000 miles. The Southern Pa-

cific Railroad is most firmly entrenched in California; it traverses the state in length and breadth. The Atchison, Topeka & Santa Fé, the Western Pacific and certain short lines are also important carriers. In addition numerous bus lines provide passenger service within the state. The state highway system covers some 14,000 miles. There are 72 airports and 133 landing fields in California. Four continental air routes bring passengers from the east, and one each from the north and the south.

Government. The executive officers consist of a governor, elected for four years, a lieutenant-governor, secretary of state, treasurer, surveyor-general, attorney-general, superintendent of public instruction, the board of equalization and 50 other boards and commissions. In the state senate there are 40 members, elected for a term of four years; the 80 members of the assembly are elected for two years. The legislature meets in regular sessions in odd numbered years and each session is split up into two parts with not more than a 30-day recess between. The judiciary comprises a supreme court with a chief justice and six associates, three district courts of appeal, and also the lower courts presided over by justices of peace and police judges. The present constitution was adopted in 1879; but since amendments are possible by a two-thirds vote of the legislature and a majority of voters concurring, many amendments have been adopted.

Education. The state maintains one of the best public school systems in the Union and has always been known for the high standard of qualifications demanded of its teachers. The schools are provided with funds through a system of state taxation. In addition to the common elementary schools, both cities and rural districts are fully supplied with high schools. Numerous junior colleges are in operation throughout the state; they relieve the pressure on institutions of higher learning during the first two years of college study. Seven teachers colleges are maintained; they are situated at Chico, Humboldt, Fresno, San Diego, San Francisco, San José and Santa Barbara. At the head of the state educational system is the University of California at Berkeley with a branch at Los Angeles. Stanford University at Palo Alto and the California Institute of Technology at Pasadena are institutions of the highest educational standing.

(See CALIFORNIA, UNIVERSITY OF; LELAND STANFORD JUNIOR UNIVERSITY; CALIFORNIA INSTITUTE OF TECHNOLOGY).

Other Institutions. The charitable institutions include hospitals for the insane at Agnews, Napa, Stockton and Ukiah; the school for the deaf and the school for the blind at Berkeley; a home for feeble-minded children at Eldridge; and a home for the adult blind at Oakland. The Preston School of Industry is at Lone. The penal institutions include prisons at Folsom and San Quentin and a state reform school at Whittier.

History. California was visited by the Spaniards in 1533, but the first exploration within the bounds of the present state did not occur until 1542, when Cabrillo visited the vicinity of Santa Barbara. In 1597 Sir Francis Drake explored the coast as far north as the forty-third parallel and named the country New Albion. The first Spanish mission was founded in 1769 at San Diego, and by 1821 twenty-one missions were in successful operation. In 1777, the Spaniards began the establishment of towns, which after the Mexican revolution in 1821 gradually increased and expanded.

The first American emigrant wagon reached the state in 1826. During the Mexican War the American forces under Colonel Fremont and Commodore Sloat took possession of Sonoma, San Francisco and other important posts. An attempt was made at Sonoma to organize a republic, but by the Treaty of Guadalupe-Hidalgo the territory became a possession of the United States. On January 24, 1848, gold was discovered at Sutter's Mill, near Coloma. The news of this discovery led to a rapid influx of settlers from all parts of the world, and in 1849 the population exceeded 100,000. Several attempts were made to form a state constitution, and finally, in 1849, a constitution which prohibited slavery was adopted; on September 9, 1850, California was admitted as a free state under the compromises of that year (see COMPROMISE OF 1850). The Union Pacific Railway was completed in 1869, and since then the state has developed rapidly.

Of more recent events the most spectacular was the great earthquake of 1906, as a result of which most of the business section of San Francisco was destroyed by fire. But the Panama-Pacific Exposition at San Francisco in 1915, as well as the construction of

Items of Interest on California

Within California there are four national parks, a striking tribute to the scenic attractions of the state. These parks are Lassen Volcanic Park, containing the only active volcano in the United States; Yosemite Park, in the lovely Yosemite Valley; Sequoia Park, the home of some of California's giant trees; and General Grant Park, another reservation of primeval sequoias.

Life in the mining camps in the pioneer days has been graphically told by Bret Harte in *The Luck of Roaring Camp*, *The Outcasts of Poker Flat* and similar stories.

Before the construction of railroads in the Far West mail was carried from Missouri to San Francisco by the six-horse "Butterfield Stage" and by the "Pony Express."

In the Mariposa Grove, just south of the Yosemite National Park, a roadway has been cut through one of the standing redwood trees with an opening large enough to allow the largest automobile to pass through: a single redwood has been known to yield 100,000 feet of timber.

Redlands is one of the most famous orange-growing and shipping centers in the world; it also ships lemons, limes, grapefruits, olive oil, wheat and barley. The flag bears the words "California Republic."

Public schools have an enrollment of over 587,000 pupils.

California produces about one-fifth of the nation's petroleum.

Occasionally rain falls in the Mohave Desert, and when it does the land is soon covered with flowers of every color. These have but a brief existence; after a few days of dry weather they wither and die.

Parker Dam, 15 miles north of Parker, Ariz., and 15 miles below Boulder Dam, on the Colorado River, is to provide water for the greatest aqueduct known to history. It is 241 miles from the dam to the terminal reservoir near Riverside, Calif.

The state flag of California, adopted in 1911, has a white background, on which is pictured a brown grizzly bear. A red

star appears above and a red strip below.

The sequoias, the largest and oldest living objects on the globe, grow nowhere but in California. There are two species, the "big trees" and the redwoods.

A State of Contrasts.

1. The highest point in the United States Mt. Whitney
2. The lowest point in the United States Death Valley
3. Largest area below sea level in the United States Imperial Valley
4. The region of heaviest known snowfall in the United States Sierra Nevada Mountains
5. The region of the highest natural air temperature in the world, 134 degrees Death Valley
6. Coolest summers in the United States Pt. Reyes
7. The point of smallest daily and annual variation in temperature in the United States Oceanside
8. Region where two years have passed without rainfall Mohave Desert
9. The only active volcano in the United States Mt. Lassen

Questions on California.

How does California compare with Texas in area? With Rhode Island?

What can be said of its coast line?

What is California's rank in population? At what rate is the population increasing?

What gave the state its popular name?

Where is the highest peak in the United States?

How does the production of gold in California compare in value with the production of petroleum?

What articles are exported in large quantities from California to foreign countries?

Why is the state a center of the moving picture industry?

What city has the largest harbor on the Pacific Coast?

What effect did the discovery of gold have upon the history of the state?

the San Francisco Bay and Golden Gate bridges commenced in 1933 are monuments to the energy and progressive character of the people living in the Golden State.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY		
Alameda	Oakland	San Diego
Bakersfield	Palo Alto	San Francisco
Berkeley	Parks, National	San Joaquin
Cascade Range	Pasadena	San Jose
Coast Range	Pomona	Santa Ana
Death Valley	Redlands	Santa Barbara
Eureka	Riverside	Santa Cruz
Fresno	Sacramento	Sierra Nevada
Golden Gate	Sacramento	Stockton
Los Angeles	River	Vallejo
Mare Island	Salton Sea	Yosemite Valley
	San Bernardino	

HISTORY	
Burbank, Luther	Panama-Pacific
Gold	International
Johnson, Hiram	Exposition
Mexican War	

CALIFORNIA, GULF OF, an arm of the Pacific Ocean, on the west coast of North America, lying between the peninsula of Lower California and the mainland of Mexico. It is about 700 miles long, in width it varies from 70 to 150 miles and in depth, from 600 to 6,000 feet. The Colorado River is the most important stream flowing into it. Valuable pearl fisheries are found on the western shore. It was formerly known as the Sea of Cortez, having been first explored by Cortez. The principal cities on its shores are Mazatlan and Guaymas, Mexico.

CALIFORNIA, LOWER. See LOWER CALIFORNIA.

CALIFORNIA INSTITUTE OF TECHNOLOGY, an institution for collegiate and graduate instruction and research in pure and applied science. It was originally founded as the Troop Polytechnic Institute in 1891; it is located at Pasadena. The Institute is supported by an endowment of \$10,000,000 and by tuition from approximately 750 students.

CALIFORNIA, UNIVERSITY OF, a state university established at Berkeley in 1868 and ranking next to Columbia University in student enrolment. It occupies a beautiful campus on the lower slopes of Berkeley Hills. Here are maintained the colleges of letters and science, commerce, agriculture, engineering, mining, chemistry and pharmacy; the schools of architecture, education, jurisprudence, librarianship and medicine (first year); the extension division, three museums, institutes of child welfare, social sciences and experimental biology; and the bureau of public administration. At San Francisco are conducted the colleges of law, dentistry and

pharmacy; schools of fine arts and medicine and the foundation for medical research. At Los Angeles are the University of California at Los Angeles, with its two colleges; also the medical research department, and a branch of the college of agriculture. The Lick Observatory is at Mount Hamilton; the Scripps Institution of Oceanography is at La Jolla and the Kellogg Institute of Animal Husbandry is at Pomona.

The university endowment exceeds \$15,000,000 with buildings and grounds of similar value. The Hearst Memorial Mining Building costing \$644,000 is one of several imposing structures; the Phoebe Hearst Greek theatre is an open air building in a grove of eucalyptus trees. The libraries contain over 600,000 volumes. The faculty exceeds 2,100 in number, and student enrolment is more than 20,000.

CALIGULA, *ka lig'u la*, GAIUS CAESAR AUGUSTUS GERMANICUS (12-41), the third emperor of Rome, the youngest son of Germanicus, and the nephew of Tiberius, whom he succeeded on the throne in A. D. 37. In the beginning of his reign he made himself very popular by his mildness and his lavish expenditures, but at the end of eight months he was seized with a disorder which permanently affected his brain, and after his recovery his career was marked by a cruelty and licentiousness little short of madness. He even considered himself a god and caused sacrifices to be offered to himself. At last a band of conspirators had him assassinated.

CALIPERS, *kal'i perz*, an instrument designed to measure the diameter or the thickness of objects. The simplest form is a pair of ordinary dividers with the legs curved into bows. A more complicated form has a graduated are attached to the dividers, so arranged that the distance between the points of the legs is accurately registered. What are known as micrometer calipers are used for measurements requiring a high degree of precision. See MICROMETER; VERNIER.

CALIPH, the name assumed by the successors of Mohammed in the government of the faithful and in the high-priesthood. *Caliphate* is therefore the name given to the empire of these princes, which the Arabs founded in Asia and enlarged within a few centuries to a dominion exceeding even the Roman Empire in extent. *Shah*, *sultan*, *emir* and other titles peculiar to the East have taken the place of caliph.

CALISTHEN'ICS, the art or practice of exercising the body for the purpose of giving strength to the muscles and grace to the carriage. The term is usually applied to the light systematic exercises that may be performed without any apparatus, or by use of such light apparatus as Indian clubs, dumb-bells and wands.

CALIXTUS, *kalix'tus*, the name of three Popes. **CALIXTUS I** was a Roman bishop from 217 to 224, when he suffered martyrdom.

Calixtus II, Guido of Vienne, Pope from 1119 to 1124, was a son of the Count of Burgundy. In the second year of his reign he expelled the antipope Gregory VIII from Rome. In 1122 he concluded with the German emperor, Henry V, the famous Concordat of Worms.

Calixtus III, Alonso Borgia, was Pope from 1455 to 1458. Though aged and feeble, he tried to institute a crusade against the Turks, but failed. An antipope, created by Frederick Barbarossa in 1178, and calling himself Calixtus III, opposed Alexander III for nine years.

CALKING, *kauk'ing*, driving a quantity of oakum into the seams of the planks in a ship's decks or sides, in order to prevent the entrance of water. After the oakum is driven very hard into these seams, it is covered with hot, melted pitch, or with cement or putty, to keep the water from rotting it. The joints of iron plates are also rendered water-tight by calking.

CALLA, *ka'la*, the name of two different kinds of plants, one of which, a native of North Africa, is known there as the Ethiopian lily, but elsewhere as the calla lily. It is really not a lily at all, but it is very popular because of the beautiful pure white spathe that surrounds the small greenish flowers. The other calla is a small flower that grows in the bogs of Northern Europe and America. It has large heart-shaped leaves and a white spathe. From the root a starch used as a food is produced. See **ARUM**.

CALLAO, *ka lyah'o*, PERU, the chief seaport of the country, and capital of a province of the same name, situated on Callao Bay, seven miles west of Lima. The city is divided into the old and the new towns, the latter having good streets and the conveniences of a modern city. The leading manufactures are sugar, hides, lumber and iron. Callao has one of the best harbors on the Pacific and is an important commercial port. Nearly all the exports and imports of Peru pass through it, and more than 1,100 ships enter and clear from its

docks each year. Population, 1931, 63,728.

CALLING HARE. See **PIKA**.

CALLIOPE, *ka li'o pe*, a mechanical musical instrument associated with circus parades. The sounds are produced by means of a series of steam whistles. They are loud and harsh and extremely disagreeable to a sensitive ear. A somewhat popular vaudeville act of recent years is an imitation of the calliope by a number of human voices.

In classic mythology Calliope was the muse of epic poetry (see **MUSES**). According to one legend she was the mother of Orpheus by Apollo.

CALMS, *kahmz*, **REGIONS OF**, the regions in the Atlantic and Pacific oceans where there is no wind for long periods of time. The region of tropical calms lies just outside the belt of trade winds in each hemisphere. It is caused by the mingling of the warm and cool atmospheric currents in these latitudes, and their consequent equality of density. The region of tropical calms follows the sun in its yearly course, being farther north in summer and farther south in winter. The region of equatorial calms is at the equator, where the current is always upward. This also moves north and south with the sun. The tropical calms of the northern hemisphere are frequently known as the calms of Cancer, and those of the southern hemisphere are called the calms of Capricorn. See **HORSE LATITUDES**; **WIND**.

CALOMEL, *ka'lo mel*, a preparation of mercury much used to counteract the effects of malaria. It is a white, tasteless powder, practically insoluble, and is a powerful cathartic. From one-half of a grain to ten grains may be given in a dose but overdoses produce a species of poisoning that shows itself in a swelling of the gums and an abnormal flow of saliva. It should never be taken except as prescribed by a reliable physician. Much harm may result from its use in ignorant hands.

CALORIE, *ka'lo ri*, a unit employed in measuring quantities of heat. The term is heard constantly in connection with the fuel values of food, wherever one strives for a balanced diet, not to eat too much, or too little, and to determine what to eat, in terms of calories. Science has determined the number of heat units in a pound of any food substance, after it is fully oxidized. A well-balanced diet should contain as many calories as will equal the heat given off during

the day. A man engaged in muscular work gives off about 3,000 calories; an equally active woman will weigh about three-fourths as much as the man, and she will need the same proportion of calories in her food. Whether in terms of food or of scientific experimentation, a calorie is the amount of heat required to raise the temperature of one kilogram of water one degree centigrade, or one pound of water four degrees Fahrenheit. See **FOOD**.

CALUMET, *kal'u met*, a famous kind of pipe formerly used by the American Indians on such occasions as the ratification of peace treaties. The bowl was made of white or red stone, and the tube was a long stem of wood or reed, decorated with feathers, quills or hair. The pipestone quarry mentioned in Longfellow's *Hiawatha* was the source of a red clay which the Indians of the Minnesota regions used in making the bowls of their calumets.

CAL'VARY, the name applied to the place outside Jerusalem where Christ was crucified, usually identified with a small eminence on the north side of the city. The term is also applied in Catholic countries to a kind of chapel, sometimes erected on a hill near a city and sometimes on the exterior of a church, as a place of devotion, in memory of the place where Jesus suffered. A rocky mound or hill on which three crosses are erected, an adjunct to religious houses, is also called Calvary.

CALVE, *kal va'*, EMMA (1866-), whose real name is EMMA DE ROQUER, is a celebrated operatic soprano, the most effective of all the stars who have portrayed the rôle of Carmen. She was born in France. Calvé made her début in *Faust*, in 1882, at Brussels, and thereafter sang with remarkable success in leading operatic rôles. She made her American début at New York in 1893, and repeated the success won at that time on several later tours, both in opera and in concert work. Though she was unsurpassed as Carmen, she also won high praise for her portrayal of the rôle of Santuzza in *Cavalleria Rusticana*, and the soprano rôles in *Sapho*, *Hamlet* and *Flora Mirabilis*.

CALVERT, GEORGE. See BALTIMORE, SIR GEORGE CALVERT, LORD.

CALVIN AND CALVINISM. The founder of the system of theology known as Calvinism was John Calvin (1509-1564), a native of Noyon, France. He was educated

in Paris, but became dissatisfied with the teachings of the Roman Catholic Church, and began the study of law in Orleans. In 1532 Calvin returned to Paris a decided convert to the Reformed faith, but he was soon compelled to leave on account of persecutions. After varied wanderings, he found a protector in Margaret of Navarre. In 1534 he returned to Paris, but in the autumn of the same year he retired to Basel, Switzerland, where he completed and published his great work, *The Institutes of the Christian Religion*.

After traveling for a time in Italy and other southern countries, he set out for Strassburg and on his way passed through Geneva, Switzerland. There he was prevailed upon by Farel, a prominent reformer, to remain and assist in spreading the doctrines of Protestantism. With Farel he soon accomplished a remarkable change in the character of the city, both of its people and of its government. A Protestant confession of faith was adopted by the city and was made binding upon all citizens. His arbitrary rule, however, made him enemies, and he was expelled from Geneva, but his friends succeeded in effecting his recall a few years later. Thereafter he built up in the city a theocracy, with himself at its head. It directed not only the religious and political affairs, but controlled the social and individual lives of the people. This was not accomplished without some difficulty, however, and Calvin was compelled to pass through numerous serious controversies. One of these resulted, through Calvin's orders, in the arrest and execution by burning of Michael Servetus, who was passing through the city. Servetus had committed no offense, except the writing of a book attacking the mystery of the Trinity.

While acting as dictator and administrator of Geneva, Calvin found time also to maintain a correspondence through all Europe, and was consulted upon points of law and theology by leaders everywhere. Up to 1561 the Lutherans and the Calvinists were as one, but in that year the latter expressly rejected important points of the Lutheran doctrine, and the two parties thereafter separated, and at times were embroiled in controversy and even war.

Calvin taught that every man is predestined to be saved or to be lost, that the saved are God's elect, and that man is regenerated

through the influence of God's spirit. Out of Calvinism rose the doctrine of infant damnation, and it has been associated generally with a severe and rigid conception of Christianity. Though the doctrines of the Presbyterian Churches are based on Calvinism, they have been greatly modified.

CALYCANTHUS, *kali kan'thus*, a genus of hardy American shrubs, characterized by the aromatic fragrance of their bark, leaves and flowers. The bark is known as Carolina, or American, allspice. Four species grow wild in the region of the Alleghany Mountains.

CALYPSO, *ka lip'so*, in Greek mythology, a nymph who inhabited an island on the shores of which Ulysses was shipwrecked. She promised Ulysses immortality if he would remain with her, and succeeded in detaining him for seven years. At the end of that time, however, she was ordered by Mercury to permit Ulysses to depart, and she aided him in preparing the raft on which he made his escape. After his departure she died of grief. See **ULYSSES**.

CALYX, *ka'lix*, in a typical flower the outermost circle. Its purpose is to protect the more delicate parts within. The calyx is usually leaflike in structure, and its separate divisions are called sepals. See **FLOWERS**.

CAM, in machinery, a simple contrivance for converting a uniform rotary motion into a varied sliding motion. It is usually a projecting part of a wheel or other revolving piece, so placed as to give an alternating or varying motion to another piece that comes in contact with it, and is free to move only in a certain direction. Cams are used in printing presses, typesetting machines, internal combustion engines and many other devices.

CAMAGUEY, *kah'mah gway*, CUBA, formerly known as PUERTO PRINCIPE, is the capital of Camaguey province and the largest city in the interior of the country. It is twenty-five miles from its port, Neuvitas, on the north coast, and forty-five miles from the south coast. A railroad runs to its port, and the city is on the main Cuban railroad between Havana and Santiago de Cuba.

Camaguey has not been a progressive city, but within recent years has shaken off its lethargy and is becoming an important center. It has narrow, winding streets; its houses indicate age, and are built of brick and stone.

There are three parks, or plazas. Cattle raising is the chief industry of that part of the island, sugar interests being second. Population, 1930, 48,773.

CAMBO'DIA, a French dependency in French Indo-China, lying to the east and north of the Gulf of Siam, and surrounded on the land sides by Siam, Annam and Cochin-China. It has an area of 67,741 square miles, and is thus a little smaller than the state of Washington. The greater part of it is low and flat, with numerous streams, the chief being the Mekong. The soil is very fertile, producing large quantities of rice, sugar cane and maize, and the vegetation generally is marked by tropical luxuriance. Cattle are raised in large numbers. Among the wild animals are the elephant and tiger. Gold and precious stones are found. In early times Cambodia was a powerful state, exacting tribute even from Siam, but it gradually fell into decay, and early in the nineteenth century lost a large part of its dominions to Siam. Magnificent ruins attest the former prosperity of the country. Since 1863 it has been a protectorate of France, and since 1884 practically a French colony, though nominally ruled by a king of its own. The chief town is Pnom-Penh, on an arm of the Mekong. Population, estimated at 2,800,000.

CAMBON, *kahN boN'* JULES MARTIN (1845-1935), a French diplomat and legislator, to whose diplomacy was due a large measure of credit for the strong political position of France. He served in the Franco-German War and afterward was given important official positions. He was Ambassador to Washington (1897-1902), and later to Berlin. He was a member of the French Academy.

CAMBRAI, or **CAMBRAY**, *kahN bra'* FRANCE, a fortified city on the River Scheldt, in the department of Du Nord, 121 miles northeast of Paris. The place has long been celebrated for its manufactures of fine linens and lawns, called *cambrics*. During the World War the city figured in some of the most serious fighting of that struggle. In November, 1917, Sir Julian Byng, commander of the British Third Army, directed a surprise attack against the Hindenburg line before Cambrai and won a brilliant success, but German counterattacks subsequently offset much of the gains achieved. Population, 26,000.

CAM'BRIAN PERIOD, the oldest division of geologic time that is distinguishable by well preserved remains of animal life. The name is derived from *Cambria*, the ancient name of Wales, where the rocks formed during this period were first studied. The Cambrian strata of the earth's surface are one of our sources of such valuable rocks and minerals as limestone, slate, manganese, gold and iron. See **CAMBRIAN SYSTEM**; **GEOLOGY**.

CAMBRIAN, *kam'brian*, **SYSTEM**, in geology, an extensive series of sandstones, conglomerates, slates and shales, lying under the Ordovician beds, and above the Archean, and divided into the Upper, Middle and Lower Cambrian. Many fossils occur in the series, including sponges, starfishes and other forms of shellfish. The Cambrian rocks are the oldest of the Paleozoic Era (which see).

CAMBRIC, *kame'brik*, a thin linen fabric used in making handkerchiefs, collars and cuffs, fine underwear and other articles of apparel. The word is said to be derived from *Cambrai*, the name of the town in France where the cloth was first woven. A cotton fabric with the fibers twisted very tightly is sold as an imitation of linen cambric.

CAMBRIDGE, *kaym'brij*, **MASS.**, the sixth city in the state in size, and one of the county seats of Middlesex County, Lowell being the other. Cambridge is practically a part of Boston, lying just across the Charles River from the greater city. Its great distinction is that it is the home of the United States' first and one of its greatest universities, for it was here that Harvard College was founded in 1636. The Boston & Albany and the Boston & Maine railroads enter the city, but local traffic is provided by adequate street-car service with subway connection into the heart of Boston. Along the Charles River is a fine water front. The city is a manufacturing center as well as a center of education; the products are varied, but the printing trade is conspicuous, a number of great publishing firms having their establishments here. In addition to Harvard, Cambridge has the Massachusetts Institute of Technology, one of the most famous schools of its kind, and Radcliffe College, for women, besides others of lesser note.

The city was founded as *Newe Towne* in 1630; in 1638 the present name was adopted, in honor of Cambridge, England. Craigie House, where Longfellow lived for many years, is now preserved as a memorial for

him. Elmwood, a fine old colonial mansion, was the home of James Russell Lowell. In the beautiful Mount Auburn Cemetery are the graves of Longfellow, Lowell, Holmes, Agassiz, John Fiske, Phillips Brooks, and many other distinguished Americans. Population, 1930, 113,643.

CAMBRIDGE, **O.**, founded in 1806, is a city in Guernsey County, fifty-nine miles north of Marietta. The region is rich in coal and iron, petroleum, gas and pottery clay, and the industries center around these products. The Baltimore & Ohio and the Pennsylvania railroads serve the city, and it has repair shops of the first-named road. There is a Carnegie Library. The town was incorporated in 1837. Population, 1920, 13,104; in 1930, 16,129.

CAMBRIDGE, **UNIVERSITY OF**, one of the two great English universities, the other being Oxford. It is located at Cambridge, a town on the River Cam. The university comprises seventeen colleges, of which Saint Peter's College, founded in 1284, is the oldest, and Downing, founded in 1800, is the most recent. Each of these colleges is a separate corporation and is governed by laws and usages of its own, although subject to the paramount laws of the university.

The university governing body is composed of a chancellor, a vice-chancellor, the masters or heads of colleges, fellows of colleges and students. The senate, which is composed of all who have taken the degree of Doctor or Master, is the great legislative assembly of the university. The chief executive power is vested in the chancellor, the high steward and the vice-chancellor, who is the head of some college. Two proctors superintend the discipline of all pupils. Women who have fulfilled the conditions of residence and standing may be admitted to the examinations. Those who pass are placed in the published lists and receive certificates; but no degrees are conferred upon them. Two colleges, Girton and Newnham, have been established for women; but they are no part of the university, though many of the university lectures are open to students of these colleges. In normal years the undergraduate students number about 5,000.

CAMBYSES, *kam bi'seez* (?-522 B. C.), a son of Cyrus the Great. After the death of his father he became king of the Medes and Persians, 529 B. C. In the fifth year of his reign he invaded Egypt, conquering the

whole kingdom within six months, but his expeditions against the Ammonites and Ethiopians failed. His violent and vindictive nature broke out in cruel treatment of his subjects, his brother Smerdis and his own wife being among his victims. Cambyeses died while on his journey home from Africa.

CAMDEN, N. J., one of the most important industrial cities of the state, the County seat of Camden County. It is situated on the east bank of the Delaware River, directly across from Philadelphia. The city is the terminus of the Pennsylvania-Reading Seashore Lines. It is connected to Philadelphia by ferry, and by the Philadelphia-Camden Bridge across the Delaware, completed in 1926.



AFRICAN CAMEL

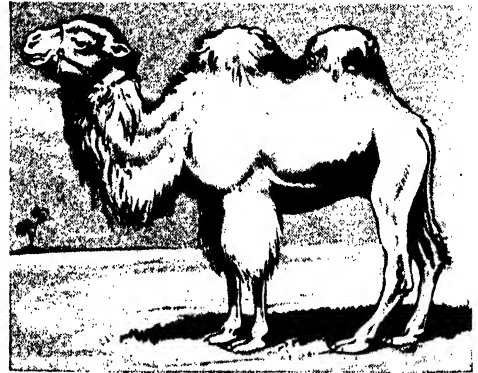
Camden's industry is widely diversified; the city is the home of some of the country's largest plants in their special fields. Among these are the manufacturing establishments of the RCA Victor Company, makers of talking machines; a great soup canning plant; a steel pen manufacturing plant. Other manufactures of importance are steam heating systems, wool seaming machines, licorice, cigars, fiber containers and glazed kid. The Camden ship-building industry is world famous.

In the vicinity of Camden were fought two battles in the American Revolution, known as the Battles of Camden. In the first, on August 16, 1780, the British under Cornwallis defeated the Americans under Gates. In the second, on April 25, 1781, an American force under Greene was defeated by the British under Lord Rawdon.

The first settlement on the site of the present city was made in 1681, and in 1773 it was named Camden, in honor of the Earl of Cam-

den. Its proximity to Philadelphia is largely responsible for its rapid growth. Population, 1930, 118,700.

CAMEL, indispensable as a beast of burden in arid countries, truly a "ship of the desert." It is a large cud-chewing animal, characterized by a long, arched neck, one or two humps on the back and a broad, fleshy pad on the sole of its foot, covering the toes. The native country of the camel is said to extend from Morocco to China, within a belt 900 or 1,000 miles in breadth. The common or Bactrian, camel, having two humps, is found in the northern part of this region exclusively, from Turkestan to China. The dromedary, single-hump, or Arabian camel,



BACTRIAN CAMEL

is found throughout the entire length of this zone, on its southern side, as far as Africa and India.

To people residing in the vicinity of the great deserts, the camel furnishes an invaluable means of conveyance. It will travel three days under a load, and five days under a rider without drinking, and the stronger animals carry burdens weighing from 700 to 1,000 pounds. The camel's power of enduring thirst is partly due to the peculiar structure of its stomach, to which are attached little pouches or water cells, capable of straining off and storing up water for use when journeying across the desert. It can live on little food, and that of the coarsest kind, consisting of leaves of trees and nettles, shrubs and twigs. In this it is helped by the fact that its humps are mere accumulations of fat, which form a store upon which the system can draw when the food supply is short. Hence the camel driver who is about to start on a long journey takes care to see

that the humps of the animal present a full and healthy appearance. Camels which carry heavy burdens will go about twenty-five miles a day, those which are used for speed alone, from sixty to ninety miles.

The camel is a rather passive animal, with much less intelligence than the horse or elephant; but it is very vindictive when injured. It lives from forty to fifty years. Its flesh is esteemed by the Arab, and its milk is his common food. The hair of the camel serves in the East for making cloth for tents, carpets and wearing apparel and is imported into European countries for the manufacture of fine brushes for painting, and for other purposes. The alpaca and llama are the South American representatives of the family.

CAMELLIA, *ka mel'i a*, a genus of plants, with showy flowers and dark green, shining, laurel-like leaves, nearly allied to the plants which yield tea. The camellia of Japan and China is a lofty tree of beautiful proportions,



CAMELLIA

which is the origin of many double varieties of our gardens. Besides this species, one with small, white, scentless flowers, and another with large, peony-like flowers, are cultivated in America.

CAMELOPARD. See GIRAFFE.

CAMEL'S HAIR, the name of the finest, softest hair obtainable from any source. It

was named originally for the camel, which animal long furnished most of the supply. Today a better quality is the finest of the hair from mohair, from the angora goat. So-called camel's hair is also taken from the tail of the squirrel. Camel's hair is used principally in artists' fine brushes. See MOHAIR.

CAMEO, *kam'e o*, the general name for all gems or stones cut in relief, that is, with raised figures, in contrast to intaglios, which are hollowed out. In a special sense a cameo is a gem composed of layers of different colors, the figures so engraved in relief that they appear in one color and the background in another. Onyx, sardonyx and agate are the stones generally used for cameos, while various kinds of shells and fine glass are used in the production of artificial cameos. The ancients were very skillful in this style of engraving, and there are still in existence many examples of wonderful workmanship, among which are some in the form of vases and dishes.

CAMERA, *kam'e ra*, an apparatus for securing pictures by photography. Inventive genius has so simplified the instrument that even the relatively indifferent person can manipulate it and secure good results.

Parts of a Camera. The word *camera* is from the Italian, and means *chamber*. The camera is not at all complicated in its construction, there being but four absolutely essential parts. These are the *box*, or *chamber*, securely closed against the admission of light where it is not desired; the *lens*, a circular piece of glass with curved faces to concentrate the light upon a plate, or film; the *shutter*, which works in the smallest fraction of a second to admit light; the *finder*, a smaller lens and mirror, by which the camera is focussed upon its object. The box, in the better class of cameras, is bellows-shaped, so that it may be lengthened or shortened to obtain proper focus upon the object to be photographed.

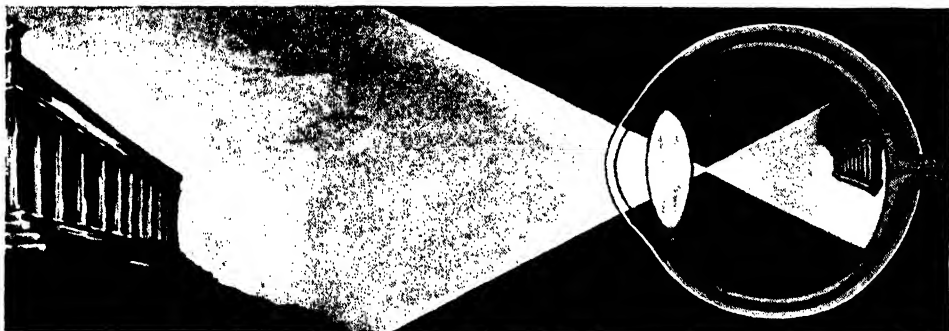
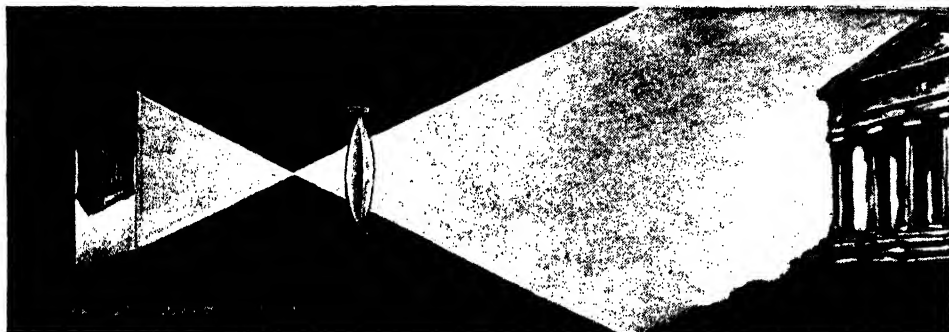
While not a part of the camera, the apparatus is useless without a sensitized plate or film, on which the picture is taken. If a plate, it is of glass, fitted into a holder, with a shutter to exclude light before being placed in the camera; the shutter is withdrawn after the plate and holder are in position. If a film, it is of celluloid, wound on spools, and long enough to receive exposures for six, eight, or twelve pictures, the sections being turned successively into position before the

lens. Plates and films to fit all sizes of cameras can be purchased.

Cameras vary in size from those which produce pictures an inch square to large panoramic instruments which take a picture eight inches in depth and twenty inches or more in length. The camera in a photographic studio is mounted on a tripod fitted with small wheels by which it can be moved easily. Hand cameras may have tripod at-

at one time; *stereoscopic cameras* are double cameras for giving a double picture on the plate; *copying cameras* copy photographs from negatives; *cycloramic cameras* turn on pivots and take panoramic views.

Among wonderful cameras are those which by complicated mechanism take a long series of pictures of moving objects and give us the amusing or instructive views common to all people as moving pictures. This phase of



COMPARING THE CAMERA AND THE EYE

The eye can take 12 to 14 pictures each second, sending them on to the brain to be interpreted. The camera records what it "sees" on the sensitized plate or film.

tachments for use in exposures requiring several seconds.

Uses of the Camera. The perfection of small, inexpensive cameras has made it possible for everybody to take pictures of vacation scenes and views of all kinds which appeal to the fancy, and this is the use of the instrument with which most people are familiar. They know, also, that the photographer uses it for portrait work. However, there are other uses to which a camera is put which are of surpassing importance. Special instruments photograph the sun, stars, and the moon; so-called *multiplying cameras* can take several pictures of the same object

photography is described under the title **MOVING PICTURES.**

CAMERON, SIMON (1799-1889), an American statesman, born in Lancaster Co., Pa. He edited a newspaper in Harrisburg in 1822, supporting the candidacy of Andrew Jackson, and thus came to possess great influence in Democratic politics. He was elected to the United States Senate in 1845 and supported the Mexican War. In 1856 Cameron joined the new Republican party and was again elected Senator. He was a formidable candidate for President in the convention of 1860, but was defeated by Lincoln, who, on becoming President, ap-

pointed Cameron as Secretary of War. He resigned under pressure in 1862, and was sent as minister to Russia. In 1866 he again became United States Senator, and he held that office until 1877, when he was succeeded by his son Don. Cameron was a strenuous opponent of civil-service reform and long was almost absolute master of Pennsylvania politics.

CAMEROON, also spelled **KAMEROON** and **KAMERUN**, is a large territory in Western Africa, divided between Great Britain and France. See **KAMERUN**.

CAMILLE, *ka meel'*, the name of the English version of a play by Alexandre Dumas, the Younger, the French title of which is *La dame aux camélias*. Camille is also the name of the heroine of the play. The leading rôle affords excellent opportunities for powerful emotional acting, and the portrayal of the name part was one of the triumphs of Sarah Bernhardt, of Olga Nethersole and Helena Modjeska. A new version of the play was produced in New York in 1917 with Ethel Barrymore as Camille. Verdi's opera *La Traviata* is based on the story. The original French drama was first produced in 1852.

CAMOEES, or **CAMOENS**, *ka mohNsh'*, **LUIZ VAZ DE** (1524-1579), the most celebrated poet of the Portuguese. He became a soldier and served in the fleet which the Portuguese sent against Morocco, losing his right eye in an engagement before Ceuta. Indignant at receiving no recognition of his services, he sailed for India in 1535, but being unfavorably impressed by the life led by the ruling Portuguese there, he wrote a satire which caused his banishment to Macao. Here he wrote the earlier cantos of his great poem, the *Lusiad*, an epic poem in ten cantos. Its subject is the voyage of Vasco da Gama to the East Indies, but many other events in the history of Portugal are also introduced. Returning to Goa in 1561, he was shipwrecked and lost all his property except his precious manuscript. After much misfortune, Camoes in 1570 arrived once more in his native land, poor and without influence, as he had left it. The *Lusiad* was printed at Lisbon.

CAM'OMILE. See **CHAMOMILE**.

CAMORRA, *ka mahr'rah*, a well-organized secret society, once spread throughout all parts of the kingdom of Naples. At one time the members known as Camorristas, were all-

powerful, levying a kind of blackmail on all markets, fairs and public gatherings, claiming the right to settle disputes and hiring themselves out for any criminal service, from the passing of contraband goods to assassination. Though originally a secret society, the Camorra did not find it necessary under the régime of the Bourbons to conceal its operations, but under the present government of united Italy, the society received its deathblow through legal processes.

CAMOUFLAGE, *kam'oo flahzh*, a term derived from the French slang verb *se camoufler*, meaning to disguise one's self. The word came prominently into use during the World War, in connection with various practices in all armies to deceive the enemy. It is thus defined in *Uncle Sam's Fact Book of the World War*:

Camouflage is the art of protective and deceptive coloring and construction. In official English, the camoufleur "practices the art of military concealment," but a more literal translation of the French music-hall phrase, for that is what it is, proves him to be a "fakir." Camouflage is to the modern soldier what the handiest bush was to the American Indian. Fighting from cover first developed from that savage warfare and now has developed to a point where specialists in all manner of devices for concealing the whereabouts and designs of our troops from the eyes of the enemy are grouped together in military units.

Wherever a machine is set up, or a trench is taken and reversed, or a battery of artillery goes into action, or a new road is opened, or a new bridge is built, or a sniper climbs an old building, or an officer creeps out into an advanced post to hear and to observe, there must go too the camouflage man to spread his best imitation of the magic veil of invisibility.

CAMP, **WALTER** (1859-1925), a prominent American authority on football and other athletic sports. He was one of the star members of the Yale football, baseball and boating teams previous to 1880, when he was graduated, and he was also prominent in general athletics. After his graduation he was chairman of the Yale athletic committee for a number of years, at the same time becoming generally known as a football expert. Camp was editor of *Spalding's Football Guide*, and every year football enthusiasts watched for his selections for the "All America" team, made up of those whom he regarded as star players. He was the author of a number of popular juvenile books, including *Jack Hall of Yale*, *Old Ruerson* and

the *Danny Fists* series. His athletic publications include *Book of College Sports*, *American Football*, *Football Facts and Figures* and *Training for Sports*.

CAMPAGNA DI ROMA, *kam pah'nya de ro'mah*, the coast region of middle Italy, in which Rome is situated. It is from thirty to forty miles wide and 100 miles long, and forms the undulating, mostly uncultivated plain which extends from near Civita Vecchia to Terracina and includes the Pontine Marshes. The district is volcanic, and its lakes, Regillus, Albano and Nemi, are evidently craters of extinct volcanoes. In ancient times the Campagna, though never a salubrious district, was well cultivated and populated, the villas of the Roman aristocracy being numerous there. During the Middle Ages it was practically abandoned because of its unhealthful character, but within recent years the Italian government has reclaimed much of the region through drainage and other improvements.

CAMPANILE, *kahm pah ne'leh*, a name applied to a bell tower, constituting a separate building adjacent to a church to which it belongs. It is commonly used by the churches of Italy. The most famous examples are the campanile of the Cathedral at Florence, designed by Giotto in the fourteenth century; the Leaning Tower of Pisa (see PISA, LEANING TOWER OF); and Saint Mark's Campanile, 302 feet high, a landmark of Venice for over one thousand years, dating from A. D. 900. In 1902 it collapsed; work of restoration began in 1905, and the new Campanile was completed early in the year 1912.

CAMPANINI, *kahm pah nce'ne*, CLEOFONTE (1860-1919), an orchestra conductor and opera director. He was born in Italy, educated there as a violinist, and when but twenty-three years of age served as conductor at the opera house of Parma. At that time the Metropolitan Opera Company of New York secured his services as orchestra conductor, an engagement which opened the way to similar positions in Milan, Rome, Naples, Venice, London and several American cities. From 1910 to 1913 he served as director of the Chicago Grand Opera Company, and in 1913 succeeded Mr. Dippel as its general manager. Campanini ranked with the world's greatest conductors; he was especially notable because of his thorough knowledge of the music of all nations.

CAMPANULA, *kam pan'u la*, a genus of herbs with bell-shaped flowers, usually of a blue or white color. It includes several American species which are known to all lovers of wild flowers. The *harebell*, also known as the *bluebell* of Scotland, is found on damp rocks and rocky hillsides, and is an exceedingly pretty and delicate plant. The *Canterbury bell* is a European species, with large tubular flowers, formerly popular in gardens.

CAMPBELL, *kam'b'l*, ALEXANDER (1788-1866), an American theologian, founder of the Christian Church, or Disciples of Christ. He was born in Ballymena, Ireland, came to America in 1807, and was for a time in the ministry of the Presbyterian church. But accepting ardently the views of his father, Thomas Campbell, as set forth in the "Declaration and Address," calling for larger unity among divided churches, he began to agitate the question of larger union among Christian bodies upon the foundation of New Testament teaching without other creeds or formulations. This led presently to the organization of the body of people known as Disciples of Christ, or the Christian Church, known in some communities at one time as Campbellites. He founded Bethany College in West Virginia, of which he was president until his death. Campbell was the editor of the *Christian Baptist* and later of the *Millennial Harbinger*. See DISCIPLES OF CHRIST.

CAMPBELL, ALEXANDER, Sir (1822-1892), a Canadian statesman, born at Heydon, Yorkshire, England; educated at Lachine and St. Hyacinthe. He studied law and became a partner of Sir John A. Macdonald; in 1860 he was appointed dean of the faculty of law in Queen's University, Kingston. His first public office was that of alderman of Kingston (1851-2). Previous to Confederation he was speaker of the Legislative Council of Canada, but resigned in 1864 to become Commissioner of Crown Lands. He took a prominent part in both the Charlottetown and Quebec conferences. He became Postmaster-General in the first Dominion Cabinet and served for six years. He was called to the Senate in 1867 and for twenty years was the Conservative leader. Under Sir John A. Macdonald he held various Cabinet positions from 1878 to 1887, the most important being Minister of Justice. On June 1, 1887, he became Lieutenant-

Governor of Ontario; he died a few days before the expiration of his term, and was buried with public honors.

CAMPBELL, COLIN, Sir, Lord Clyde (1792-1863), a famous British soldier, born in Glasgow. He was educated at the high school at Glasgow and afterward at the military academy at Gosport, and in 1808 he received an ensign's commission in the Ninth Regiment of Foot. He served in Spain under Sir John Moore and Wellington, had a part in the expedition to the United States in 1814, and from 1819 to 1825 was in the West Indies. In 1842 he was in China, and on the termination of the Chinese War he saw active service in India. On the outbreak of the Crimean War he became major-general, with the command of the Highland Brigade, and took a prominent part in repulsing the Russians at Balaklava. Campbell was appointed to the first command at the outbreak of the Indian mutiny, relieved Havelock and Outram at Lucknow, and crushed the rebellion entirely before the end of the year. He was created a peer, with the title of Baron Clyde, and had a large income allotted him. In 1862 he was made field marshal. He was buried in Westminster Abbey.

CAMPBELL, THOMAS (1777-1844), an English poet, author of several lyrics dear to every patriot of England. His stirring *Ye Mariners of England* is an admirable example of verse having martial spirit and rhythm, as shown by the following four lines taken from the poem:

Britannia needs no bulwarks,
No towers along the steep;
Her march is o'er the mountain waves,
Her home is on the deep.

Campbell was born in Glasgow, and educated at the university in that city. After leaving the university, where he had won a reputation by his poetical translations from the Greek, he lived for a short time in Edinburgh. He rose suddenly to fame on the publication, in 1799, of his *Pleasures of Hope*. In 1803, he published an edition of the *Pleasures of Hope* with the addition of the lyrics *Hohenlinden*, *Ye Mariners of England* and *The Exile of Erin*, and in 1809 he published *Gertrude of Wyoming* and *The Battle of the Baltic*. In 1820 he became editor of the *New Monthly Magazine*, a position which he held for ten years. Campbell took an active part in the foundation of

London University, and in 1827 he was elected rector of Glasgow University. He died at Boulogne and was interred in the Poets' Corner, Westminster Abbey.

One of his popular ballads, Lord Ullin's Daughter, will be found in the article Language and Grammar.

CAMPBELL-BANNERMAN, SIR HENRY (1836-1908), a British statesman, Premier of England from 1905 to 1908. He was a Campbell, and the additional name of Bannerman was added under the terms of the will of a maternal uncle. He entered Parliament as a member for Stirling district, Scotland, in 1868, and represented that district until his death. Throughout Gladstone's career, Campbell-Bannerman was loyal to him and served as Secretary for War in Gladstone's administrations of 1886 and 1892. In 1899 he became the Liberal leader of the House of Commons, and in 1905 he succeeded Balfour as Premier. In 1908 he resigned because of ill health. Sir Henry was distinguished for moderation, good sense and clear vision rather than for brilliance of intellect, but he helped to unite the Liberal party and to lay the foundations for the work of his successor, Herbert Asquith.

CAMPEACHY, or CAMPECHE, *kahm-pay-chay*, MEXICO, a seaport on the west coast of the peninsula of Yucatan, at the mouth of the San Francisco River. Campeachy is the capital of a state of the same name. Shipbuilding and the manufacture of cigars are the chief industries. A considerable trade in campeachy wood and wax is maintained, but the harbor is shallow and can be entered only by vessels of light draught. Population, 17,000.

CAMP-FIRE GIRLS, an organization for the physical, mental and spiritual development of girls from ten to twenty years of age. It is very similar in purpose and methods to the Boy Scouts (which see), and was organized in 1911 by Luther H. Gulick and his wife. The organizers of this practical society planned to make it a medium for teaching girls the beauty and sanctity of homemaking, and the necessity of developing the body and soul harmoniously. The symbol of the organization is fire, which stands for home, service and romance; the watchwords are Work, Health, Love. Three degrees of membership may be attained—Wood Gatherer, Fire Maker and Torch Bearer. The sole requirement for becoming a Wood Gatherer

is ability to repeat the prime law of the Camp-Fire Girls;

Seek beauty	Hold on to health
Give service	Glorify work
Pursue knowledge	Be happy
Be trustworthy	

Those who attain the degree of Fire Maker learn a chant known as the *Fire Maker's Song*:

As fuel is brought to the fire,
So I purpose to bring
My strength,
My ambition,
My heart's desire,
My joy
And my sorrow
To the fire
Of humankind.
For I will tend
As my fathers have tended,
And my father's fathers
Since time began,
The fire that is called
The love of man for man,
The love of man for God.

Ability to carry out the following lines of activity is also essential:

To help prepare and serve, together with the other candidates, at least two meals for meetings of the Camp-Fire.

To mend a pair of stockings, a knitted undergarment and hem an article having a hem at least one yard in length.

To keep a written, classified account of all money received and spent for at least one month.

To tie a square knot five times in succession correctly and without hesitation.

To sleep with open window or out-of-doors for at least one month.

To take an average of at least half an hour daily outdoor exercise for not less than a month.

To refrain from soda water, chewing gum and candy between meals for at least one month.

To name the chief causes of infant mortality in summer. Tell how and to what extent it has been reduced in one American community.

To know what to do in the following emergencies: clothing on fire; person in deep water who cannot swim; open cut; frosted foot; fainting.

To know the principles of elementary bandaging and how to use surgeon's plaster.

To know what a girl of her age needs to know about herself.

To commit to memory any good poem or song not less than twenty-five lines in length. Know the words of America.

To know the career of some woman who has done much for her country or state.

The successful aspirant for the highest degree must win certain honors.

Every Camp-Fire organization has a bead

officer known as the Guardian, who serves by virtue of a license obtained from the New York City headquarters. Local organizations may be formed at any time, and complete information for the necessary steps may be obtained from the headquarters in New York.

CAMPHOR, *kam'fur*, a whitish translucent gum with a bitterish, aromatic taste and a strong stinging odor. It is derived from the bark and wood of a tree belonging to the laurel family, found in various parts of the Far East. Camphor is used in great quantities in the manufacture of pyroxylin, an explosive constituent; for several years past the Japanese island of Formosa has supplied practically all of the world's requirements. The industry in Formosa has long been operated under a government monopoly, and the forests have been depleted to such an extent



BRANCH OF CAMPHOR TREE

that the government is giving serious attention to forestry and conservation methods. To bring about an improvement in the world's supply the development of the camphor tree in Florida has been undertaken, and there are now several thousand acres under cultivation in that state.

The extraction of camphor gum is accomplished by steam distillation. The product is drained, volatile oil is removed by pressure, and the resulting mass is then purified. What is known as *spirits of camphor* is a mixture of camphor, alcohol and water. The common uses of the gum and the liquid are well known. Spirits of camphor has antiseptic qualities, and when taken internally it acts as a stimulant. It is used to alleviate hysteria and inflammation of the large intestine, and in the treatment of cholera. Taken in too large doses, it acts as a poison. Camphor gum, besides being utilized in the making of explosives, is employed in the manufacture of celluloid. It is also an ingredient of a variety of moth balls.

CAMPO SANTO, *kahm'po shan'to*, (holy field), the Italian name for a burying ground, used especially to designate the more remarkable of these places, those which are surrounded with arcades and are richly adorned. The most famous Campo Santo is that of Pisa, which dates from the twelfth century, and has on its walls frescoes of the fourteenth century of great interest in the history of art.

CAMPS AND CAMPING. There comes a time in the life of every boy when he wants to go camping. This is a natural desire which should be encouraged and led into proper channels rather than suppressed by the objections of parents. The wish to go camping may be due to a variety of reasons, but it is inevitably a healthful desire. Nobody but the veriest "tenderfoot" now thinks of camping as necessitating hardships; the camper, young or old, can be just as comfortable as he is at home. Not only has he comfort, but he has the freedom of all out-of-doors.

Equipment and Clothing. In an article of limited scope it is possible to give only a few suggestions which may prove valuable to all campers. Each party must determine for itself what camp and personal equipment shall be taken. The question of food is also a matter which must be determined according to the likes and dislikes of the individual members. Each member of the party, if possible, should have his waterproof canvas bag for clothing—the less clothing the better. Four pairs of woolen socks, two gray flannel shirts, two sets of woolen underwear, a suit of woolen pajamas, a pair of trousers and a woolen sweater will be all the extra clothing needed for camping in the woods in

the fall or early spring. Woolen garments are better than cotton, because they dry more rapidly if wet, and generally keep the body at a more even temperature. The best sort of a hat is an old soft felt one, with a moderate brim which will shed the rain.

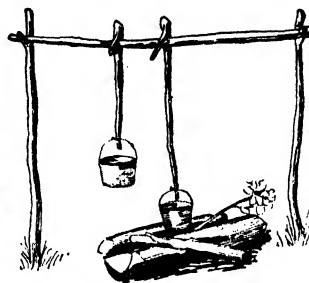
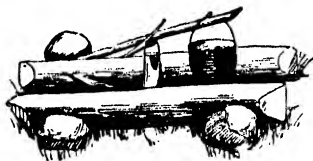
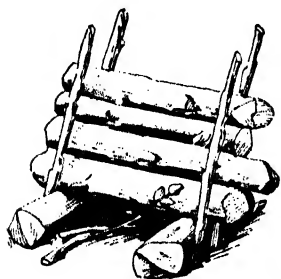
For summer outings some light clothing will be necessary, but even in the hottest months woolen clothing and a sweater should be on hand. Just what additional things to take one will know only after he has camped out several seasons. Take an extra pair of shoes and a pair of moccasins if possible, some thread, needles, buttons, a pair of scissors, a toothbrush, a pocket comb in a case, several towels, a small mirror, a note book with a place for a pencil in the back. Do not take ink. A compass and a waterproof match safe will be useful, especially in the woods. Keep this match safe only for emergencies and never leave camp without it. In any camp there must be several good jackknives, a saw, axe, nails and twine. The average boy will find that a magnifying glass and a field glass will add to his enjoyment, for both will enable him to get in closer touch with nature.

Choosing a Site. Strange as it may seem, not many people are able to select a good camping ground. Few people think that a camp really is a camp unless they can see water from the tent. There is always the temptation to make camp on the edge of a lake or stream. This should never be done, as the low ground is damp and generally infested by mosquitoes. If there is no high land near the shore make your camp on some point projecting out into the water, where the currents of air keep most of the mosquitoes away. It is more important to have the camp near a good supply of wood, as it is easier to carry necessary water than the firewood. If you can find the right sort of a place make your camp on ground sloping to the south; this will give the sun a chance to shine into your tent. Never build a camp in dense woods, on account of falling timber, or where water will settle after a rain, or near dead wood or underbrush, which is always a breeding place for mosquitoes and other insects.

Camp Fires. After locating your camp the first thing to do is to get a fire started—easy enough when there is plenty of dry wood, but difficult when there has been a long rain and everything is soaked with

water. In rainy weather, if you cannot find dry wood, hunt for a cedar, as it splits and ignites easily. After you have chopped it into firewood, take some of the smaller pieces and stack them in a pyramid to make a draught. Then from the dry heart of the tree whittle enough shavings to start the fire. If you cannot find a cedar you can generally get some dry birch bark on the lee side of a tree and some dead twigs which will give enough of a blaze to dry firewood. There

a quick, hot fire that is soon spent. The following woods will burn scarcely at all when they are green: Aspen, black ash, balsam, boxelder, pitch pine, sycamore, tamarack and poplar, chestnut, red oak and red maple burn very slowly when green. All of the soft pines crackle and are likely to pop; certain hardwoods such as sugar maple, beech and white oak, must be watched for a time after the fire is started, because the embers they shoot out are long-lived



THREE WAYS OF BUILDING A CAMP FIRE

may be no birch or cedar; then the only thing is to chop into a fallen tree for dry wood and whittle shavings. If it is still raining, build the fire on the lee side of some tree or boulder. Never underestimate the amount of firewood required for the night; it is better to have too much than to hunt around for more before daybreak. In the winter time never make camp fire under a tree covered with snow, as the heat will melt the snow and the water may put the fire out.

There are various ways of building a night fire; only one of the simplest will be described here. First cut two green stakes and drive them slantingly into the ground. At right angles to a line between the stakes lay on the ground two large, green logs for fire-dogs, and on these pile small stuff and dry wood. Pile five-foot logs against the stakes and then drive two more stakes to hold them in position. As the bottom log against the stake burns away the one above it will drop in its place and you will have a fire which will burn evenly all night.

One glance at the fire will tell what kind of a camper built it. The log fire just described will throw its heat forward into a tent or lean-to, and will last for hours, but it is useless for cooking. As a general rule, hardwoods make good, slow-burning fuel that yields lasting coals, and softwoods make

and hence more dangerous than those of softwoods. The best of all firewoods is hickory, green or dry; it makes a hot fire, lasts a long time, and burns down to a bed of hard coals that keep an even heat for hours.

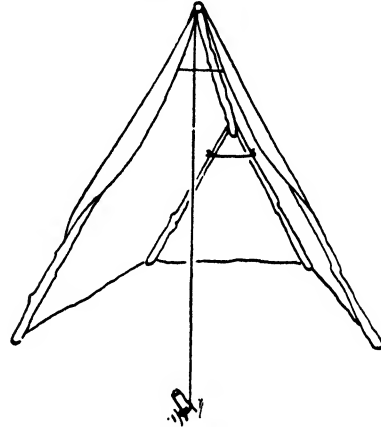
For cooking and baking, a bed of hot coals is generally better than live flame; only the novice piles on more wood when he begins to cook. There are a great many ways of building the fire for cooking and as many ways of arranging and supporting the utensils. If a high wind is blowing and the camp is in an unprotected spot, it may be wise to dig a fire hole, so that the hot coals will not be blown away. The simplest way, however, is to level off the tops of two green logs, and after laying them eight inches apart at one end and four at the other, to build a fire between them. Another method is to hang the coffee-pot or tea pail from a crane made by driving a crotched stick into the ground and resting a long green pole in the crotch, one end being held down by a stone or a log, the other end being over the fire. The common way, however, is to set two crotched sticks in the ground one on each side of the fire, and put a cross piece from one to the other; from this cross piece hang forked sticks, with nails driven into them at various heights to hold the pails. Frying may be done over two logs rolled

into the fire. In a permanent camp three pieces of lead pipe, wired together, are often used as a rack.

Shelter. The most quickly constructed shelter is made by leaning three seven-foot poles against a fallen tree, and then spreading your tarpaulin or rubber blankets over the poles. Be sure the tree is flat on the ground or there will be a draught under it. The most popular brush camp is the lean-to, the only practical brush camp to have when there are more than three persons in the party. First drive two crotched sticks into the ground about eight feet apart, and on these put a stout sapling. Against this lean poles, about a foot apart, making them secure at the bottom by sticking them into the ground or by rolling a log against them. On this framework, and up and down the sides lay hemlock or spruce boughs, which should be lapped like shingles so that they will shed the rain.

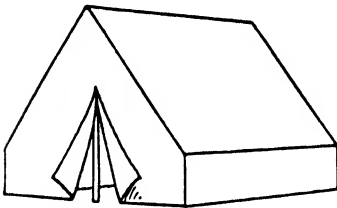
These brush shelters are good enough for a temporary camp, but if you are to camp for a considerable length of time a tent will

is recommended. In this case poles are not absolutely necessary; a strong tape may be

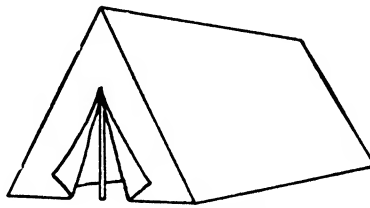


SIMPLE "A" TENT

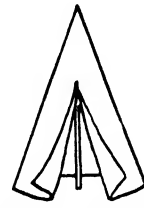
sewed along the ridge of the tent, ending in a loop at each end, from which a light rope is stretched between two trees, the ropes being made taut by two poles bracing it at each end and outside of the tent. In set-



WALL TENT



A-TENT



BELL TENT

THREE STYLES OF TENTS

be a great convenience. The kind of tent you buy will depend on the number of people who use it and the price you are willing to pay. A good tent is a luxury, but a poor tent is an abomination; buy the best one your purse can afford. A tent should be easy to set up. It should shed heavy rains, and should stand securely in a strong wind. It should keep out insects and cold drafts, but let in the rays of the camp fire and plenty of pure air. It should be cool and airy on summer days, but warm and dry at night. Probably no single tent has ever been devised which will fulfill all these conditions at the same time; certain kinds of tents are better for one purpose than another. For a fixed camp, a wall tent is generally preferred, because it is easy to set up and has plenty of head-room. For extreme lightness and ease of pitching the A-tent

ting up an A-tent most campers use center poles at the front and back to support the ridgepoles; the accompanying sketch shows a simple method of setting up a tent without using the center poles. First cut a ridgepole and four diagonal supports of the proper length. Tie two of the supports with marline two feet from the ends to hold up the front end of the ridgepole, and tie the other two poles in the same way for the back end. Through the top of the tent run a rope about two and a half times as long as the tent; then lift up the ridgepole and the tent and support it by the diagonal braces. Tie the long rope to short stakes driven into the ground about ten feet from the front and back of the tent, then spread the braces till the tent just touches the ground and is ready to be pegged down. When the tent sags, as it always will during

a rain, you have only to pull in the poles at the bottom in order to make everything taut again.

After the tent is up the first thing to do is to level off the ground. You should decide how you will lay your bed and level the ground so that your feet will be lower than your head. The details of furnishing a tent can be merely mentioned here; racks and hooks for pots, guns, tools, clothes and game will be needed. If you have a floor cloth, spread it out; if not, cover the ground with balsam or cedar twigs and shoots. If your tent has an awning in front, that is just the place for a dining table. Inexperienced campers generally omit one other detail which is necessary to comfort. If the ground, as it should, slopes from the back of the tent to the front, dig small trenches at the back and sides, about six inches or a foot outside the tent. In severe rainstorms no other devices will keep the inside of the tent dry and comfortable. A little experience in adapting himself to whatever conditions he has to face will enable the camper to improve his outfit from year to year. Lack of experience should never deter any one from camping.

CAMPUS MARTIUS, *ka'm'pus mar'shus*, a large open space in the suburbs of ancient Rome, consisting of the level ground between the Quirinal, Capitoline and Pincian hills and the River Tiber. This space was set apart for military exercises and was sacred to the god Mars, whence the name. In the latter period of the republic it was a suburban pleasure ground for the Romans, and it was laid out with gardens, shady walks, baths and theaters. The site is now occupied by a thickly-settled portion of the modern business city.

CANAAN, *ka'nan*. See **PALESTINE**.

CANAANITES, in general, the name given to the heathen nations found dwelling in Palestine west of the Jordan. At the time of the Israelitish invasion these different nations were the Hittites, Jebusites, Hivites and Amorites. It is not to be inferred from the collective name applied to them that all these peoples were the descendants of Ham, who, according to Bible genealogy, was the father of the Canaanites. On the contrary, their origin can be traced to a number of different sources.

The Canaanites were gradually subdued by the Israelites, but in Solomon's time all

paid tribute. In language government, morals and religion these people were different from the Israelites, the principal feature of their religion being the worship of Baal and Asherah, his consort, who was called "the happy." The symbol of Asherah was the stem of the tree, though this was sometimes carved into an image. The symbol of Baal was probably a cone, and represented the rays of the sun. It was undoubtedly the mingling of these symbols in large numbers which constituted the groves of Baal, so frequently mentioned in the historic books of the Old Testament.

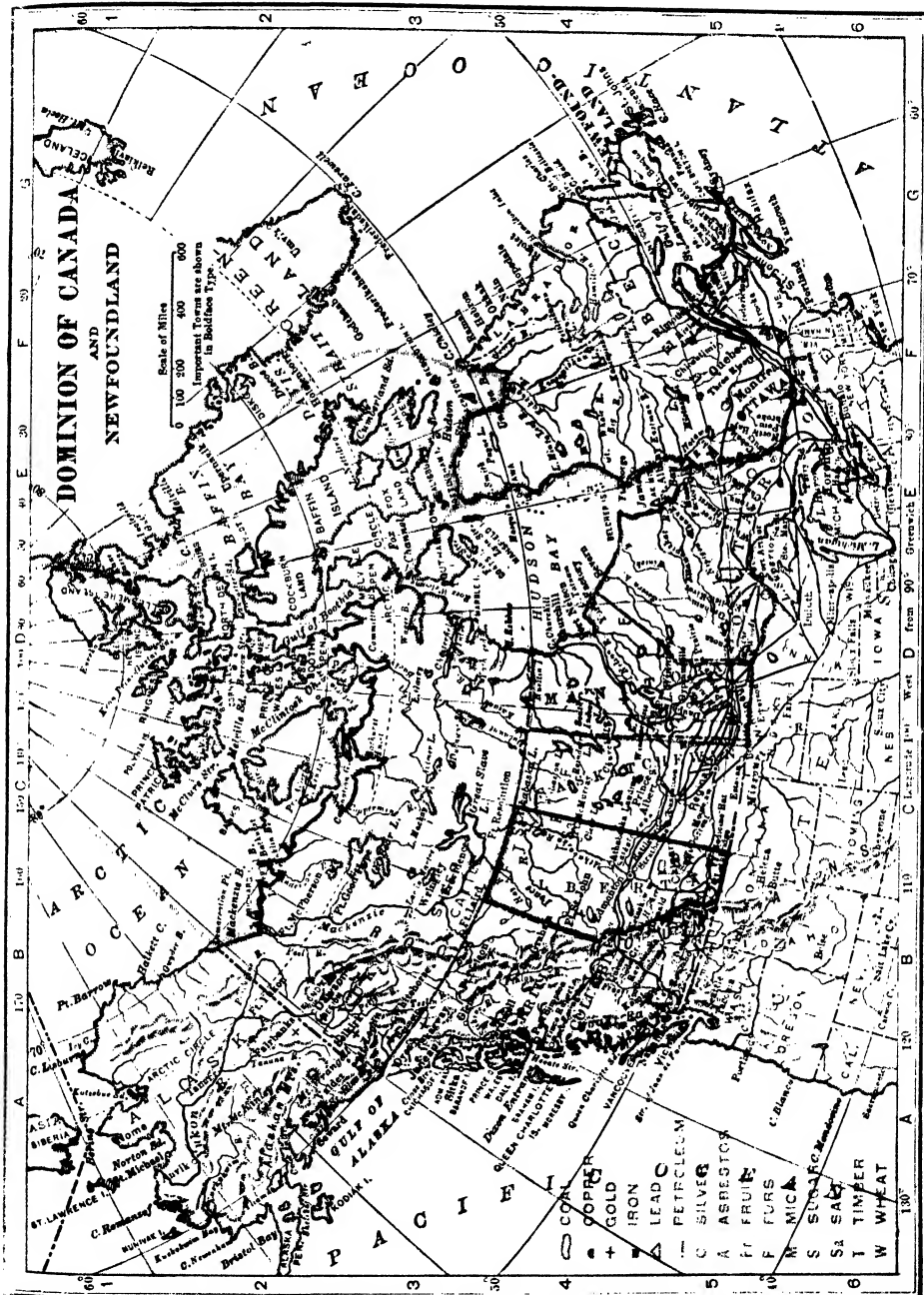


Coat of Arms
of Canada

CANADA, DOMINION OF, the largest and most important overseas members of the British Empire, stretching across the North American continent from ocean to ocean north of the United States, excepting in the northwest corner, where is situated the United States territory of Alaska. To the north are the icy waters of the Arctic Ocean. Its greatest width from east to west is 3,700 miles; its length from north to south is about 1,600 miles. Parts of the southern portion are as densely populated as many of the states of the American Union. Above the 60th degree of latitude there are few people; beyond the 65th parallel only hunters and trappers usually are found.

The land area of Canada is 3,542,049 square miles, about 500,000 square miles larger than continental United States. Only by including all outlying possessions of the latter, is the territory of the United States equal to that of Canada. Canada's population in 1931 was 10,376,786; because of the vast northern plains this is an average of only about three people to the square mile. The density of population is shown in the table on page 661.

A Study in Areas. Canada is nearly as large as the continent of Europe. The foreigner is inclined to take the view that it is only a small part of North America. Few realize that many of the provinces are empires in themselves; that British Columbia is almost three times as large as Great Britain and Ireland, nearly twice as large as France,



DOMINIONS OF CANADA AND NEWFOUNDLAND

CANADA		3,690,043 square miles
Total area		
Total population		10,376,782
Capital: Ottawa, Ont.; population		126,872
Railways		43,173 miles
ALBERTA		255,285 square miles
Area		
Population		731,605
Capital: Edmonton; population		79,197
Chief Cities: Calgary; population		83,767
Lethbridge; population		13,489
Railways		5,709 miles
BRITISH COLUMBIA		355,855 square miles
Area		
Population		694,263
Capital: Victoria; population		59,082
Chief Cities: Vancouver; population		246,593
New Westminster; population		17,521
Railways		5,323 miles
MANITOBA		251,832 square miles
Area		
Population		700,149
Capital: Winnipeg; population		218,785
Chief Cities: Brandon; population		17,082
St. Boniface; population		16,305
Railways		4,420 miles
NEW BRUNSWICK		27,985 square miles
Area		
Population		408,219
Capital: Fredericton; population		8,830
Chief Cities: St. John; population		47,511
Moncton; population		20,689
Railways		1,931 miles
NEW SCOTIA		21,428 square miles
Area		
Population		512,849
Capital: Halifax; population		59,275
Chief Cities: Sydney; population		23,039
Glace Bay; population		20,706
Railways		1,931 miles
ONTARIO		412,582 square miles
Area		
Population		3,431,683
Capital: Toronto; population		631,205
Chief Cities: Hamilton; population		155,547
Ottawa; population		126,872
Railways		11,000 miles
PRINCE EDWARD ISLAND		2,184 square miles
Area		
Population		88,038
Capital: Charlottetown; population		12,361
Chief Cities: Summerside; population		3,759
Souris; population		1,063
Railways		279 miles
QUEBEC		594,431 square miles
Area		
Population		2,874,255
Capital: Quebec; population		130,594
Chief Cities: Montreal; population		818,577
Hull; population		29,433
Sherbrooke; population		28,935
Railways		4,907
SASKATCHEWAN		251,700 square miles
Area		
Population		921,785
Capital: Regina; population		53,209
Chief Cities: Saskatoon; population		43,291
Moose Jaw; population		21,299
Railways		8,601 miles
YUKON		207,076 square miles
Area		
Population		4,230
Capital: Dawson; population		975
Railways		58 miles
NORTHWEST TERRITORIES		1,309,682 square miles
Area		
Population		9,725
NEWFOUNDLAND		42,734 square miles
Area (not including Labrador)		
Population (not including Labrador)		277,287
Capital: St. Johns; population		42,645
Railways		904 miles
LABRADOR		112,400 square miles
Area		
Population		4,261
Capital: St. Johns, Newfoundland		
Railways		None

NOTE.—The population statistics are from the latest census returns.

and as large as Chile, which is over 2,700 miles in length; or that Saskatchewan is as large as Austria-Hungary. The accompanying map, showing general comparisons, graphically suggests the greatness of the

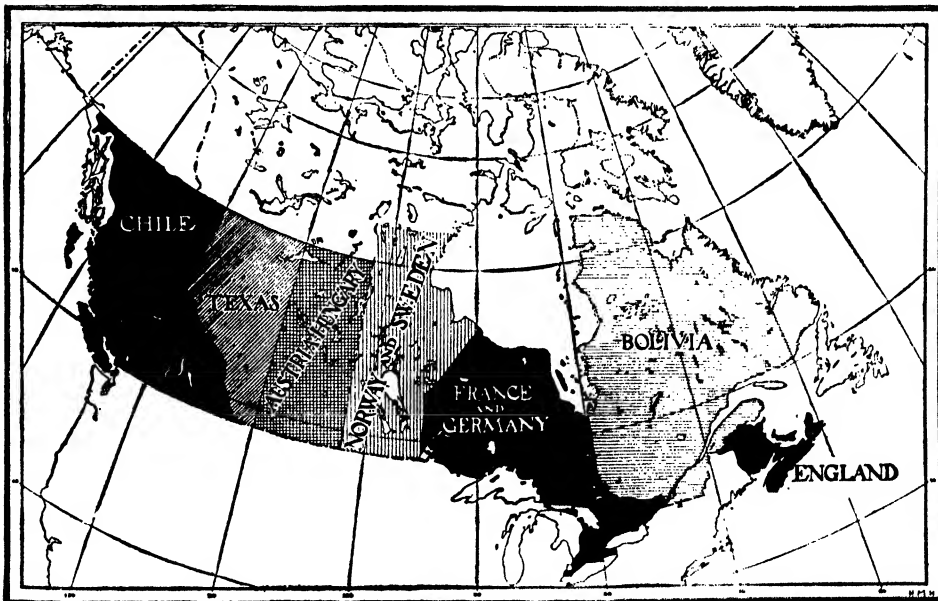
ada's first settlers, and there are hundreds of communities in Quebec that are yet entirely French in language and customs, and are likely long to remain so. Nova Scotia was settled largely by the Scotch; in New Bruns-

PROVINCES	POPULATION 1931	TOTAL AREA SQUARE MILES	DENSITY OF POPULATION PER SQ. MILE
Prince Edward Island	88,038	2,184	40.27
Nova Scotia	512,846	21,428	24.71
New Brunswick	408,219	27,985	14.73
Quebec	2,874,255	594,434	5.04
Ontario	3,431,683	412,682	9.45
Manitoba	700,139	251,832	3.11
Saskatchewan	921,785	251,700	3.37
Alberta	731,605	255,285	2.94
British Columbia	694,263	355,855	1.98
Yukon	4,230	207,076	.02
Northwest Territories	9,723	1,309,682	.006
All Canada	10,376,786	3,690,043	2.96

Dominion and its possibilities for development.

The People. Canada, like the United States, is a "melting pot of the nations." The census of 1931 lists as residents of the

wick, Ontario and some parts of lower Quebec the early settlers were loyalists who left the English colonies at the south when the Revolutionary War drove them to a decision between loyalty to Britain and



GRAPHIC ILLUSTRATION OF AREAS OF CANADA AND OTHER POLITICAL DIVISIONS

Dominion people of more than a score of diverse nationalities, each represented by at least 2,500 persons, and scattered throughout the provinces from coast to coast. English is the official and school language of all the provinces except Quebec, which has both French and English. The French were Can-

espousal of the cause of the American colonists. They were an important and influential element in Canadian progress.

Large numbers of citizens of the United States during the present century have emigrated to Canada, particularly to the "prairie provinces." From March, 1900, to

March, 1921, the number from the United States who sought new homes in Canada totaled 1,375,000. The American exodus to Canada is about 20,000 per year at the present time.

Religions of the People. In 1925 the Methodists, Congregationalists and a large number of Presbyterians united to form the United Church of Canada.

The following table gives the names of the larger religious bodies and the number of their adherents according to the census of 1931:

Roman Catholics	4,098,547
United Church of Canada	2,016,773
Anglican	1,635,269
Presbyterians	870,496
Baptist	443,227
Greek Church (Catholic and Orthodox)	288,688
Lutheran	293,950
Jews	155,592
Salvation Army	30,634
Pentecostal	25,706

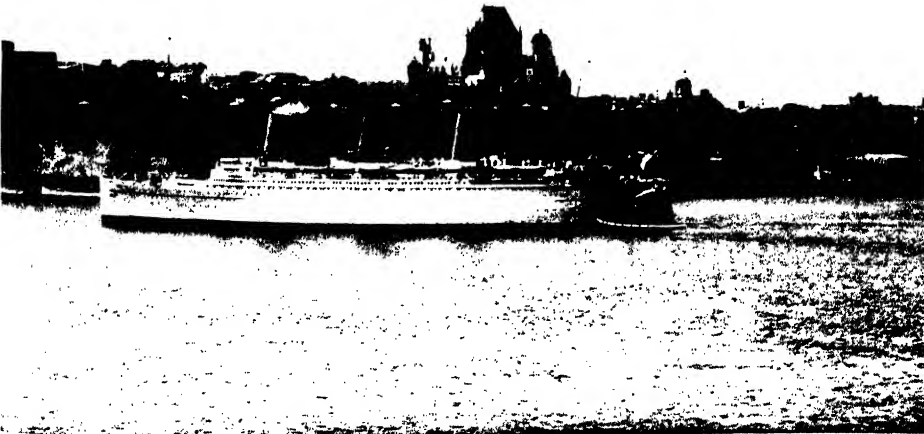
Surface and Drainage. In respect to surface, Canada can be divided into three great regions; the eastern highlands, the central plain and the western, or Rocky Mountain, highlands. The eastern highland region extends from the Atlantic coast westward to the southern extremity of Hudson Bay. It is characterized by ranges of low mountains and hills and approximately level plains. The highest land in the east is found on the coast of Labrador, where some of the peaks reach up to 8,000 feet. The Laurentian Mountains, north of the Saint Lawrence River and nearly parallel with it, in some places attain a height of about 4,000 feet. Detached summits or buttes from this range are found westward as far as Montreal, the mountain of Montreal being one of these peaks, and to the south of the river and a little east of this several others rise.

Extending westward from the eastern highland region is the great central plain of Canada, which is a continuation northward of the plain in the United States. Along the international boundary this is about 700 miles wide and terminates in the foothills of the Rocky Mountains, which form a part of the boundary between Alberta and British Columbia. Extending northward, this plain includes the northeastern corner of British Columbia, and then its western boundary follows the Rocky Mountains between Mackenzie and Yukon. The Rocky Mountain highlands begin with the foot-

hills of the Rocky Mountains in Alberta and extend westward to the coast. This region embraces the provinces of British Columbia and Yukon Territory; the southern part of it is broken by numerous ranges of the Rockies and coast ranges.

About 250 miles north of the Saint Lawrence River and running parallel with it as far as Ontario, is a low ridge, known as the Height of Land, separating the waters of the Saint Lawrence basin from those flowing into the eastern side of Hudson Bay. After entering Ontario this height of land continues westward north of the Great Lakes until it reaches a point a little west of Lake Nipigon, when it bends southward and extends diagonally across Minnesota to the headwaters of the Red River of the North. From here it bends to the northwest, and after traversing Dakota in an irregular line, reenters the Dominion at the northwestern corner of this state. It then extends westward near the international boundary until it reaches the Rocky Mountains. Another similar divide starts in Alberta a little north of Edmonton and extends northeasterly through that province and across Saskatchewan nearly to the eastern boundary, when it bends to the north and northwest and extends through Mackenzie to Lake Aylmer, thence northeasterly to Melville Peninsula. This divide separates the waters flowing into Hudson Bay on the west from those finding an outlet in the Arctic Ocean through the Backs, Coppermine and Mackenzie rivers.

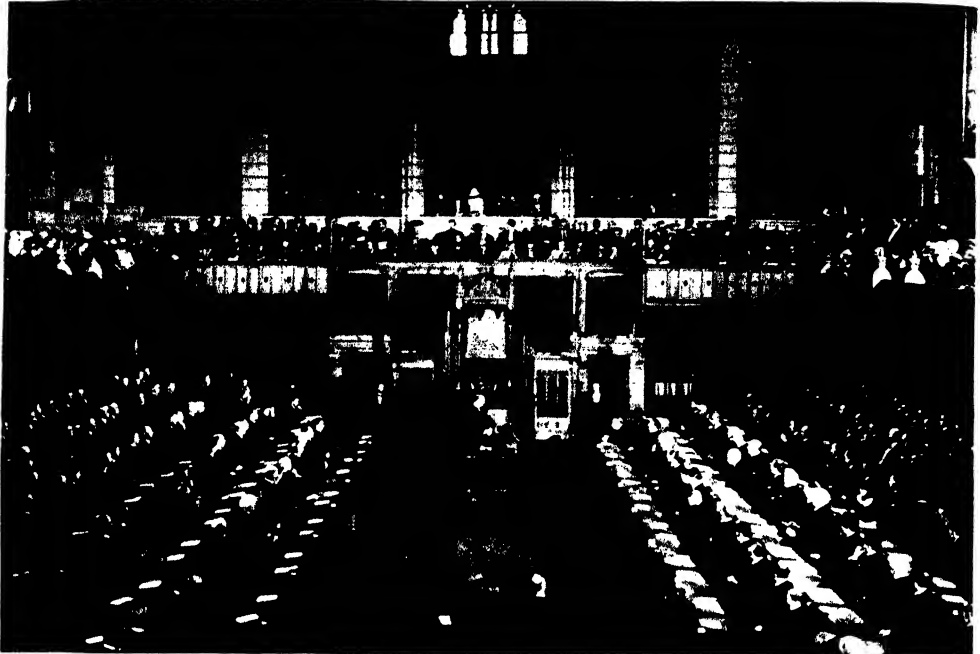
The Saint Lawrence, with its tributaries, is the largest and most important river system. Its basin includes the Great Lakes, nearly one-half of which belong to Canada. From the north the important tributaries are the Saguenay, the Saint Maurice and the Ottawa, while the most important tributaries from the south are the Richelieu and the Saint Francis. The northern part, or the region between James Bay and the Atlantic Ocean, is low and contains a number of lakes. All of the central plain south and east of the watershed crossing Alberta is drained into Hudson Bay. The important rivers are the Saskatchewan and its outlet, the Nelson, and the Churchill. The most important lake in this region is Lake Winnipeg. To the north and west of the watershed are the Athabasca, Mackenzie, Coppermine and Backs rivers, which furnish drainage for the northern part of Alberta, Saskatchewan and



CANADA

Above: Dominion Parliament Building and clock tower, Ottawa.

Below: The Harbor of Quebec, with S. S. Empress of Britain riding at anchor; Chateau Frontenac on the Heights.



Canadian Gov't Photo

SCENE AT OPENING OF THE DOMINION PARLIAMENT

The Prime Minister delivering his address.



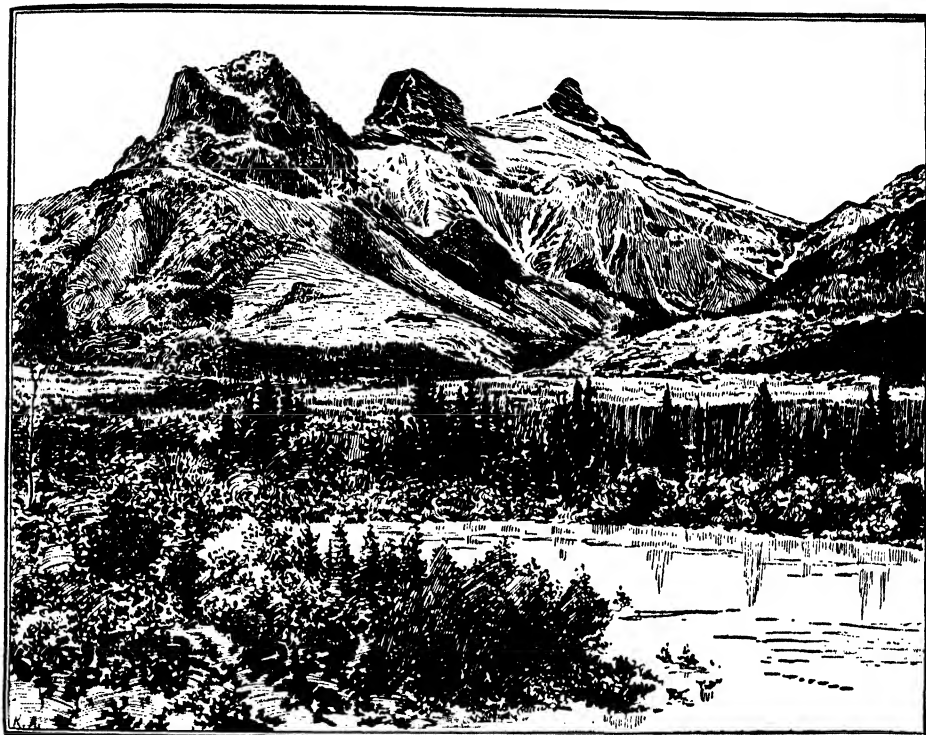
Ewing Galloway

LOW TIDE AT ST. JOHN, NEW BRUNSWICK

A 30-foot tide is not unusual in this part of the Bay of Fundy.

nearly all of the great areas of North West Territories. In the northern part of this region are numerous large lakes, the most noted being Athabasca, Great Slave Lake and Great Bear Lake. West of the main range of the Rocky Mountains the principal rivers are the Columbia, the Fraser, the

Brunswick and Quebec have severe winters, frequently accompanied by great depths of snow, and short, hot summers. While the rainfall in this region is not heavy, it is everywhere sufficient for agriculture. The southern portion of Ontario on account of its proximity to the lakes, has a much more



THE THREE SISTERS, CANMORE

Skeena and the Stikine. The greatest body of water in Canada is Hudson Bay, a veritable inland sea covering over 400,000 square miles and more than four times as large as all the Great Lakes.

The physical features of the various provinces are more minutely described in articles relating to them, in their alphabetical places in these volumes.

Climate. Canada extends from near the 40th parallel to northern land limits; its great extent from north to south, as well as varied local conditions between the Atlantic and Pacific coasts, gives the Dominion wide variety of climate. The cold currents in the Atlantic which flow along the coasts of Labrador and Newfoundland impart to this region a cold, damp climate; hence the provinces of Nova Scotia, New

equable climate, but in the northern portion and in the heart of the continent, occupied mostly by Manitoba and Saskatchewan, the extremes of an interior continental climate are manifest.

In Manitoba the summers are hot, while during winter the thermometer often descends to 50° below zero. However, the dry atmosphere of this region mitigates the severity of the cold. At Medicine Hat, "where the weather comes from," the winter temperature is often milder than in Illinois. To the westward and along the eastern slope of the Rocky Mountains, the climate is much more salubrious, owing to the Chinook winds, which modify the severity of the winter (see CHINOOK), while to the west of the principal mountain range British Columbia, owing to

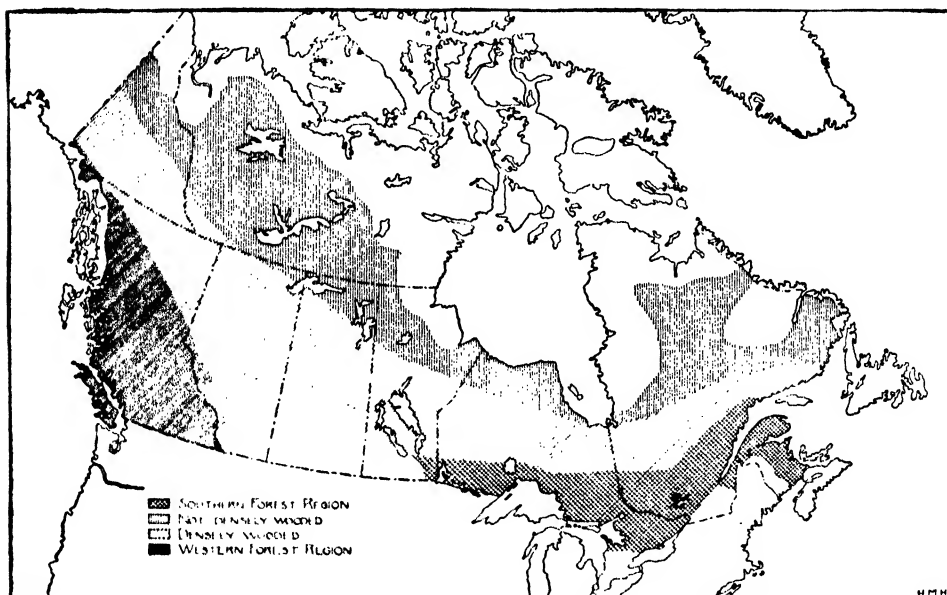
the influence of the warm winds from the Pacific, has a comparatively mild climate throughout the year. The Yukon and the North West Territories have an arctic and sub-arctic climate. With the exception of a few areas in the center of the great plain, all portions of the Dominion have ample rainfall.

For vegetation and animals, see North America, subheads Vegetation and Animal Life.

Mineral Resources. Canada is abundantly supplied with valuable minerals. Near the turn of the century the production of minerals was about \$20,000,000 a year, but this has increased ten-fold. Iron of excellent quality is found in abundance in

The gold mines at Porcupine, near Lake Superior, have made the vicinity one of the world's greatest gold fields (see PORCUPINE). In Ontario, at Copper Cliff, is the largest nickel plant in the world; the mines produce more than half of the world's output of this metal. Petroleum and salt are also found in the peninsula between Lakes Erie and Ontario, and there are valuable quarries of asbestos and building stone, the latter being widely distributed through the Dominion. The principal source of asbestos is Quebec.

Agriculture. The extreme northern part of the Dominion is too cold to admit of cultivating the soil, but the soil and climate of the southern provinces, and of nearly all of the



DIVISIONS OF THE WOODED AREAS OF CANADA

Quebec, Ontario and British Columbia. The district around Lake Superior and Lake Huron has valuable deposits of copper and some silver.

Nova Scotia contains some of the richest coal fields in North America, and on Vancouver Island in British Columbia are valuable mines of bituminous coal, while in Alberta and Saskatchewan are found large areas of good quality. The area of the entire coal measures of Canada is estimated at about 100,000 square miles.

Gold has been found in nearly all provinces, but it occurs in paying quantities only in Ontario, the Yukon and British Columbia.

vast interior and of the valleys in British Columbia, are well adapted to tillage. Agriculture is the leading industry of Canada, and seven-tenths of the people are engaged in some sort of agricultural occupation. There is invested in agriculture in the Dominion over \$5,500,000,000. Of this great total about one-sixth is in Ontario; the balance of agricultural wealth is swinging to the "prairie provinces." Each province is especially adapted by soil and climatic conditions to certain lines of agriculture, and in every case those occupations which are best adapted to each locality constitute its chief industries. The great interior is being



HYDRO-ELECTRIC PLANT, PANGAN, QUEBEC

Main dam, 917 feet long, with head of 156 feet. Plant designed for 272,000 horsepower



Photos by U. & U.

PAPER MILL, THREE RIVERS, QUEBEC

On St. Lawrence River, about 80 miles below Montreal. The mill has a capacity of 700 tons of newsprint paper a day



CANADIAN STATESMEN

1—Richard B. Bennett; 2—William L. MacKenzie King; 3—Earl of Bessborough; 4—George Howard Ferguson; 5—William Duncan Herridge.

rapidly developed, and it constitutes one of the greatest wheat regions in the world. In general, the important crops are wheat, potatoes, oats, barley, peas, beans, beets and flax. Cattle, horses and sheep are raised in large numbers, and dairying has become a very important industry, Canada ranking as the first country in the world as an exporter of cheese.

For detailed description of Canadian agriculture, see articles under the different provinces.

Lumbering. Canada has a more extensive forest area than any other lumber-producing country in the world. The lumber industry may be divided into three great sections:

(1) The southern forests, including most of southern Ontario, the St. Lawrence Valley and the maritime provinces. The principal trees of this region are maple, beech, ash, birch, pine, spruce and cedar.

(2) The northern forests, which reach across the continent from the Gulf of St. Lawrence to the Rocky Mountains. The southern strip as shown on the chart is densely wooded, spruce, pine, tamarack and poplar being the most valuable trees. North of this strip is another, known as the not densely wooded, including such hardy varieties as spruce, larch and canoe-birch.

(3) The western or Cordilleran forests, which extend from the Rocky Mountains to the Pacific Ocean. The common trees in this region are Douglas fir, cedar, black pine and white spruce.

Lumber Cut. For many years white pine was the most important source of the timber supply, but now spruce has gone far into the lead. With the growth in lumbering in British Columbia, the Douglas fir is gradually increasing in value. The average output of the sawmills in Canada is about 3,000,000,000 feet, board measure, about 3,000,000,000 shingles, and 1,100,000,000 laths, besides other products, with a total value of over \$125,000,000.

For the development of forestry and the forest reserves, see *Forests and Forest Reserves in Canada*.

Fisheries. Canada possesses the most extensive fisheries in the world, and the Dominion also can boast that its waters contain the principal food fishes in greater abundance than they are found elsewhere. Along the Atlantic Ocean are 5,000 miles of shore line; along the Pacific, 7,000 miles. The Atlantic deep-sea fishing is conducted from twenty to ninety miles off shore; sailboats have very generally disappeared and power boats, fleetier and easier to handle, have appeared within the last few years to the num-

ber of over 13,000 on both sides of the continent. The Atlantic catch consists largely of cod, haddock, hake, and halibut. Inshore fishing nets cod, haddock, hake, halibut, herring, mackerel, shad, flounder and sardine.

The Pacific fisheries are famous for the vast salmon catch (see *SALMON*), though there are important halibut grounds in Northern British Columbia waters. The fisheries of Canada have been steadily increasing in value from year to year, owing sometimes to rising prices, but largely because of increase in population and the still higher cost of meats. The total yearly catch is worth fully \$40,000,000. Of this amount, \$18,000,000 is credited to British Columbia and \$13,000,000 to Nova Scotia. There are 600 fish canneries. See *FISH AND FISHERIES*.

Manufactures. Canada has all the raw material needed to develop vast manufacturing enterprises. However, other industries have yielded good results and various pioneer activities in most localities engaged first attention for many years. Before the World War the Dominion possessed about 18,000 factories, large and small. That conflict greatly increased the number for war purposes, and it left the country more than ever before industry-minded. There are now about 25,000 establishments making almost every conceivable merchantable article. With the exception of electrical development and sale of power, the pulp and paper industry exceeds all others in capitalization, and the latter is second only to the canning and preserving industry in value of products. The total value of manufactured articles is over \$2,150,000,000 per year.

Transportation. See *RAILROADS OF CANADA*; *CANALS OF CANADA*.

Canada and the World War. The Dominion needed no urging from the mother country to rush to the defense of the empire, endangered by the German onslaught upon the liberty of free peoples. Only a few hours after Great Britain declared war against the Teutonic powers a call was issued for the meeting of Parliament. The Governor-General, in addressing that body at its first session, August 18, 1914, prophesied that—

“... the spirit which animates Canada inspires His Majesty's dominions throughout the world, and we may be assured that united action to repel the common danger will not fail to strengthen the ties that bind together these vast dominions.”

Sir Wilfrid Laurier, leader of the Liberals, the Opposition party, surrendered politics and declared that his party would join with stout hearts—

" * * * to fight for freedom against oppression, for democracy against autocracy, for civilization against reversion to that barbarism in which the supreme law, the only law, is the law of might."

The first appropriation of Parliament was for \$50,000,000 for war expenditures, and a call was made for volunteers for overseas duty. The response was instant; not only did soldiers come forward in response to the first call for men, but private purses were opened for the cause. One man gave \$500,000, another \$100,000, to equip regiments and batteries. During the first two years of the war there were 361,861 enlistments for active service; this number was increased to over 450,000; about 390,000 had gone to Europe, the remainder being held in reserve in Canada. Particular instances of patriotic response are worthy of record, but only two of many can here be recorded. At Perdue, Sask., out of a total population of 500, eighty-seven men joined the colors at Firdale, Man., in 1917 not an unmarried man between the ages of eighteen and forty-five remained at home.

There was eventually a limit to voluntary enlistments, yet more men were needed to increase the ranks in France and to replace losses. For a year conscription was discussed. The example of the United States in adopting conscription encouraged those in charge of the government, and in 1917 the elections were bound up with the question of drafting men for service. The people of Quebec, under the leadership of Laurier, stoutly resisted conscription, offering to retire from the Dominion if it were adopted and this attitude was embarrassing to the other provinces. The French-Canadians had borne little part in voluntary enlistments, and refused to be coerced. However, loyalty to the cause in other provinces gave the conscriptionists a large majority.

Special Service. While Canada's chief military effort was concentrated on the Canadian expeditionary force on the western front, the Dominion made a variety of other contributions to the war. A notable example was in the air service. Unofficially it is said that thirty-five per cent, or more

than 13,000, of the British air pilots in France were Canadian, a remarkable record in itself. Other Canadian units, such as railway troops and hospitals, served in Palestine, Macedonia and Greece. Another corps which left Canada was trained for service with the tanks, an imperial service like the air force.

Casualties and Honors. The number of killed, wounded and missing totaled about 165,000 men. Of these a few more than 45,000 were killed or were believed to be dead; of the wounded nearly 40,000 recovered and returned to the front.

Canada's soldiers in France won undying fame, and were dreaded as combatants by the Germans, for they neither gave nor asked quarter and took few prisoners. Their heroism at Ypres and at Chemin des Dames will forever form one of the most brilliant pages of the history of the great conflict. The list of honors won in the field is as follows:

Victoria cross	30
D. S. O.	432
Bar to D. S. O.	18
Military cross	1,467
Bar to M. C.	61
D. C. M.	939
Military medal	6,549
First bar to M. M.	227
Second bar to M. M.	6
Meritorious service medal	119
Mentioned in dispatches	2,573
Royal Red Cross	130

Contributions of Munitions. One of the Dominion's most important contributions to the allied cause was in the department of munitions. During the last six months of 1917 no less than fifty-five per cent of the total British output of eighteen-pounder shrapnel shells came from Canada, and most of these were complete rounds of ammunition which went direct to France. Canada also contributed forty-two per cent of the total 4.5-inch shells, twenty-seven per cent of the six-inch shells, twenty per cent of the sixty-pounder high explosive shells, fifteen per cent of the eight-inch and sixteen per cent of the 9.2-inch shells. In addition Canada supplied no less than 450 miles of rails torn up and shipped direct to France.

The munitions board also let contracts for ships amounting to \$70,000,000, representing forty-three steel and fifty-eight wooden ships, aggregating 360,000 tons.

The following details of munition production are impressive:

Total number of shells produced 60,000,000.

Approximate number of components represented by above for which imperial munitions board awarded separate contracts, 670,000,000.

Quantity of high grade explosives and propellants produced, 100,000,000 pounds.

Value of orders placed by the British government, through the imperial munitions board, \$1,200,000,000.

Approximate number of contractors in Canada among whom contracts for munitions were distributed, 1,000.

Number of workers engaged in war contracts, 200,000 to 300,000.

Approximate number of persons employed in handling stores in transportation and other collateral organizations, 50,000.

Approximate total number of workers, 350,000.

Government. The Dominion is as democratic in its form of government as any other country in the world. Not many years ago an eminent Premier thus summed up Canada's freedom of political action:

Canada is a state within a greater state, the Empire itself. Our country enjoys a constitution granted nearly fifty years ago and formulated by the wisdom of the Fathers of Confederation, men whose names still stir the hearts of all Canadians, Macdonald, Cartier, Brown and Tupper. Within the limits of that constitution the people of Canada govern themselves, and each citizen exercises his individual influence in determining how his country shall be governed. That is a right established by the principles upon which democratic government is based.

The Dominion is really a federation of states known as provinces, originally united under the British North America Act. The Imperial Conference of 1926 authorized the British Commonwealth of Nations, one of whose members is the Dominion of Canada, and the status of Canada as a free country is further emphasized. The Imperial Conference thus defined the status of the Commonwealth members: "The self-governing dominions are autonomous communities within the British Empire, equal in status though united by a common allegiance to the Crown." Canada is therefore to all intents and purposes as free a nation as is any republic.

The chief executive is nominally the sovereign of Great Britain; his personal representative in Canada is the Governor-General, personally appointed by the king, for a term of five years. The legislative authority rests with a Parliament, consisting of two houses, the Senate and the House of Commons. The Senate consists of members who are nominated by the Governor-General and hold

their positions for life. Each Senator must be a born or naturalized subject, thirty years of age, and possessed of real or personal property to the value of at least \$4,000 in the province for which he is appointed. The House of Commons consists of members elected by the people for five years and apportioned among the provinces according to population.

The Dominion government enacts all criminal law, establishes and maintains the penitentiaries and also enacts all laws relating to bankruptcy, solvency, the coinage of money, naturalization, aliens and Indians, and in general legislates upon all subjects not expressly assigned to the provincial legislatures. Each province has a separate Parliament and is independent in all local matters. The provincial Parliaments are chosen by popular suffrage, and the executive head of each province is a Lieutenant-Governor appointed by the national government. In all the provinces except Quebec the provincial Parliaments are composed of one chamber, which is generally known as the Legislative Assembly.

The administration of justice is based on the English system, except in the province of Quebec, where the old French law prevails. Each province has its lower courts, which have jurisdiction within the county, and also a supreme court, whose jurisdiction extends over the province. The courts having jurisdiction throughout the Dominion are the exchequer court and the supreme court, which is the ultimate court of appeal in civil and criminal cases. Under certain conditions cases may be appealed to the privy council.

County and Local Government. In *Ontario* the county councils are composed of councillors elected by "county council divisions," the number of which depends on the population of the county. The assembly has provided for the election of a mayor and three aldermen for each ward in cities. Any community with a population over 10,000 may become an incorporated city. Every town has a mayor and three councillors for each ward when there are less than five wards, or two councillors when there are more than five. A township or a village has a reeve and four councillors. All officers are elected by general vote except in cities and townships divided into wards; then election is by wards. Women have the right to vote, and can be elected to the assembly.

In *Quebec* the county councils are composed of the mayors of the "local municipalities"—that is, the parishes, towns and villages, each of which is governed by seven councillors who elect the mayor from their own number. Cities have special acts of incorporation. Women may vote.

In *New Brunswick* the county councils consist of two councillors from each parish and of a warden chosen annually by the council. Cities are specially incorporated. Woman suffrage prevails.

In *Nova Scotia* the councils are elected by the taxpayers, one councillor for each district; a few districts, enumerated in the law, have two councillors. Town councils are composed of a mayor and not less than six councillors. All the towns are now subject to a general act passed by the provincial legislature. Women are voters.

In *Manitoba* the city and town councils consist of a mayor and two aldermen or councillors for each ward; the village council is composed of a mayor and four councillors. In a rural district the chief executive is the reeve. Woman suffrage prevails.

In *Saskatchewan* there is a provincial department of municipal affairs. The minister or commissioner has general superintendence in county and local matters. In cities the councils consist of a mayor, elected annually, and from six to twenty aldermen; in towns, they consist of a mayor and six councillors, three elected each year; in villages the governing body is composed of three councillors. In rural municipalities the council consists of a mayor and one councillor for each division. Women are voters, and they may be elected to the legislature.

In *Alberta* the provincial minister of public works has supervision of municipal affairs. Rural municipalities and towns are governed under the Consolidated Ordinances of the North West Territories of 1905, which provide a council of a reeve and four councillors for the rural districts, and a mayor and six councillors for the towns. Woman suffrage prevails.

In *British Columbia* townships and rural districts are governed by a reeve and a council of four to seven members. Councils of cities established since 1892 consist of a mayor and five to nine aldermen. Nanaimo, New Westminster, Victoria and Vancouver are governed under special statutes. Mayors and Reeves are elected annually by general

vote, aldermen and councillors by wards where such exist, otherwise also by general vote. Women are given the right to vote.

History. The Sagas of Iceland tell of the voyages of the Vikings, Eric and Leif, to the shores of North America, and it was by them, probably, that Canada was first visited. These ventures, however, amounted to nothing, and John Cabot made in 1497 the first real discovery of the North American continent. He planted on the shores of Newfoundland the standard of England, and it was on this that Great Britain based her claim to America. Within twenty years after Cabot's visit, fishermen—English, Basque and Breton—began to visit the cod banks in great numbers. The French explorers entered Canada early in the sixteenth century, and the energy and good fortune of the French allowed them for a time to outstrip the British in the newly found territory. Jacques Cartier, the greatest of these early explorers, sailed three times to the New World between 1534 and 1542 and spent the winter of 1535–1536 on the site of Quebec. De la Roque, Sieur de Roberval, made an attempt to found a colony at Cape Rouge in 1541, but his attempt failed utterly. For fifty years from this time France paid little attention to Canada, although French fishermen still frequented the cod banks. The English however, had by no means forgotten it. In 1583 the first attempt at an English settlement was made by Sir Humphrey Gilbert, but his colony at Saint John's Newfoundland, was short-lived. The first permanent settlement in Canada was made at Quebec in 1608 by Champlain and a few years later a temporary settlement was made at Montreal. It was by Champlain, too, that the first alliance was made with the Hurons and Algonquins, which led later to the conflicts with the Iroquois. Quebec rapidly became the center of the fur trade, upon which the prosperity of New France—as French territory in Canada was called—was based from first to last.

Richelieu in 1627 organized the Company of New France, which held sway in Canada until 1663 and possessed the monopoly of the fur trade. Meanwhile, the Jesuits had appeared in Canada, and for many years they exercised the most powerful influence over civil affairs there. When Colbert came to power in France under Louis XIV, the treatment of Canada by France was bettered



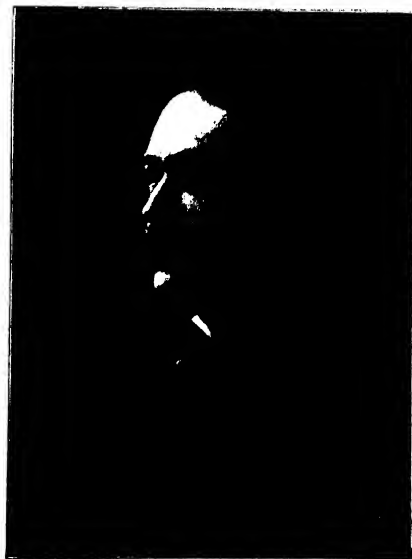
LORD STRATHCONA



SIR JAMES P. WHITNEY



REV. ALBERT CARMAN



WILLIAM HENRY DRUMMOND

EMINENT CANADIANS



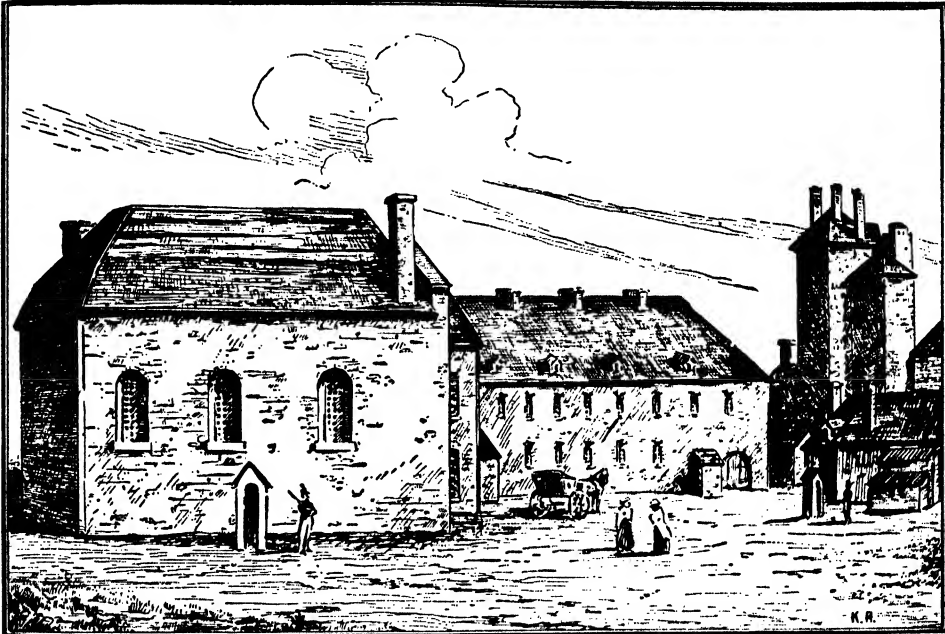
GROUP OF EARLY GOVERNORS-GENERAL

somewhat, because he realized the value of the colony to the mother country. The fur trade was regulated by new rules, and women were taken to the colony from France as wives for the colonists. In 1672 Frontenac was made governor of New France, and it was under his rule that La Salle explored the upper Mississippi and that military posts were established at Niagara, Mackinac and in the Illinois territory.

There had been, as early as 1629, clashes between the French and English in Canada,

and very few of them left Canada. From 1760 to 1764 the country was under military government, and for the ten years following 1764 it was under a provisional government which consisted of a governor general, assisted by an executive council. In 1774 the Quebec Act was passed, which united to Canada the Great Lake territory, allowed Roman Catholics the free exercise of their religion and vested the rule of the territory in a governor and a legislative council appointed by the crown.

Shortly after the passage of this act oc-



OLD BISHOP'S PALACE, QUEBEC, WHERE FIRST PARLIAMENT OF LOWER CANADA MET IN 1792

but it was not until the outbreak, in 1689, of the first of the so-called French and Indian Wars, that the real contest between the French and English for supremacy in North America began. In 1763, by the Treaty of Paris, France ceded to Great Britain Canada and all the territory east of the Mississippi, except the city and district of New Orleans, and renounced all claims to Acadia.

For some years subsequent to this time, the Canadian, who had been harassed for so long by war, had a period of rest. The French in Canada found that their affairs were as well looked after under the new, as under the old, government, and that they were to be allowed the practice of their re-

ligion, and very few of them left Canada. This was an important crisis in the history of Canada. Emphatic appeals were made to the Canadian French to join the American colonies in their rebellion; the country was invaded and seemed for a time destined to come under the control of the thirteen colonies. The province remained loyal to England throughout, however, and the restoration of peace in 1783 brought to it a distinct gain in the emigration from the United States to Canada of over thirty thousand American loyalists. These new inhabitants proved to be among the foremost of the real makers of Canada.

The area of Canada, however, was de-

creased by the Treaty of 1783, as the territory which forms Michigan, Wisconsin, Ohio, Indiana and Illinois was ceded to the United States. In 1791, by the Constitutional Act, Canada was divided into two provinces, Upper Canada and Lower Canada. Lower Canada had at this time a population of perhaps 125,000, most of whom were of French descent, while Upper Canada had a population of 20,000, who were almost entirely English. Each division was given a government of three branches: a legislative council to be appointed by the king, an assembly chosen by popular vote and a governor and executive council to be appointed by the king. English laws and institutions were not imposed on the French provinces. New Brunswick, Nova Scotia, Cape Breton and Prince Edward Island were given administrations similar to those of the other two provinces.

The Constitutional Act by no means settled the difficulties in Canada, as from the first much dissatisfaction was felt in both provinces. The War of 1812 between England and the United States drew them together somewhat and united them for a time more firmly to the mother country, but after the close of the struggle the dissatisfaction again became apparent. In 1837 both Upper and Lower Canada were disturbed by an insurrection, and in 1840 it became plain to the British government that the wisest policy was to reunite them. In 1840, therefore, the act to reunite the provinces of Upper and Lower Canada became a law. Provision was made under the new constitution for a legislative council, whose members were to be appointed for life by the governor; for a legislative assembly, to consist of an equal number of members from Upper and Lower Canada; for a governor, to be appointed by the Crown, and for an executive council, to be chosen by the governor from the legislative council and the legislative assembly.

Formation of the Dominion. By an act of the British Parliament in 1867, New Brunswick, Nova Scotia and Upper and Lower Canada were formally joined into one Dominion of Canada, and British Columbia and Prince Edward Island were added later. The legislature of Newfoundland decided in favor of joining the dominion, but the popular vote was against the union, and Newfoundland remained separate. The vast territory of the Hudson's Bay Company was

purchased by the Dominion in 1869, and in 1884 this led to an insurrection of colonists and natives under Louis Riel. The insurrection was put down, and the great so-called Northwestern Territory was afterward divided into Keewatin, Mackenzie, Yukon, Assiniboia, Saskatchewan, Alberta and Athabasca. These last four were in 1905 united into two provinces, Alberta and Saskatchewan.

The first French-Canadian to become Premier was Sir Wilfrid Laurier, who held that office continuously from 1896 to 1911. During his administration and that of his successor, Sir Robert Borden, there was great development in the Dominion; particularly notable was the rapid growth of the great northwest, the "prairie provinces." The Canadian map was materially changed



CANADA, BEFORE 1912

in 1912, when vast, unorganized territories were cut up and added to the provinces of Quebec, Ontario and Manitoba. The area of Quebec was increased from 351,873 square miles to 706,834; Ontario, from 260,862 to 407,262; Manitoba, from 73,732 to 251,832 square miles.

One great factor in the rapid development of Western Canada was the discovery of the rich gold deposits in the Yukon region. The richest mines which the great "strike" of 1897 developed were on the Canadian side of the Canada-Alaska boundary. The movement westward made known the wonders of the great undeveloped West, and helped to stimulate settlement. The organization of the provinces of Alberta and Saskatchewan served further to attract home-seekers. The completion of the Canadian Northern and Grand Trunk Pacific railroads in 1915 opened up new areas and made it easier for

those already on the ground to market their products.

After the war Canada turned its attention to the consolidation of the works of peace. Two major events were of prime importance in its historical development. During the administration of Prime Minister Mackenzie King, Canada attained the status of an independent nation, coordinate with Great Britain in the British Commonwealth as a result of the Imperial Conference at London in 1926. And at another Imperial Conference, held at Ottawa, in 1932, during the administration of Prime Minister Bennett, a series of trade agreements with Great Britain and other members of the British Commonwealth were entered into, calculated to cement the commercial relations of Canada with the other dominions and to insure permanent markets for the products of its industry. In recent years Canada has become one of the greatest wheat producing and exporting countries in the world.

Related Articles. Consult the following titles for additional information:

BIOGRAPHY

Abbott, Sir John J. C.	Hincks, Sir Francis
Aberdeen, John C. G.	Howe, Joseph
Allan, Sir Hugh M.	Hughes, Sir Sam
Archibald, Sir Adams	Lafontaine, Sir Louis
Argyle, Ninth Duke of	Hypolite
Arthur, Julia	Laurier, Sir Wilfrid
Baldwin, Robert	Le Moine, James M.
Begin, Louis N.	Lighthall, William D.
Bell, Robert	Lisgar, Lord
Bell-Smith, Frederick	McBride, Sir Richard
B.	McGee, Thomas
Bengough, John	D'Arcy
Wilson	Macdonald, Sir John
Blake, Edward	A.
Borden, Sir Robert L.	Mackenzie, Alexander
Bowell, Sir Mackenzie	Mackenzie, Sir Alex-
Brock, Sir Isaac	ander
Brown, George	Mann, Sir Donald
Rulyea, George H.	Minto, Gilbert John
Campbell, Sir Alexan-	Monck, Charles S.
der	Montcalm, Marquis
Carleton, Sir Guy	de
Carman, Bliss	Mount Stephen, Lord
Cartier, Sir George E.	Osler, Sir William
Chapleau, Sir Joseph	Papineau, Louis J.
A.	Riel, Louis
Connaught, Duke of	Roberts, Charles G.
Cotes, Sara Jeannette	D.
Davies, Sir Louis	Ross, Alexander
Henry	Saunders, Margaret
Dawson, George M.	M.
Dawson, Sir John	Secord, Laura
William	Simcoe, John B.
Devonshire, Duke of	Strathcona and
Drummond, William	Mount Royal,
Henry	Baron
Duncan, Norman	Taché, Alexander
Durham, John George	Traill, Catherine
L.	Parr
Elgin, James Bruce	Tupper, Sir Charles
Frontenac, Comte de	Vancouver, George
Galt, Sir Alexander T.	Van Horne, Sir
Grey, Earl	William C.
Haliburton, Thomas	Whitney, Sir James
C.	P.
Hays, Charles M.	

CITIES AND TOWNS

See lists under different provinces.

GULFS AND BAYS

Baffin Bay	James Bay
Belle Isle, Strait of	Juan de Fuca
Fundy, Bay of	Puget Sound
Georgian Bay	Saint Lawrence,
Hudson Bay	Gulf of

ISLANDS

Anticosti	Queen Charlotte
Cape Breton	Sable
Magdalen	Thousand Islands
Manitoulin	Vancouver

LAKES

Athabaska	Muskoka
Champlain	Nipigon
Erie	Nipissing
Great Bear	Ontario
Great Lakes	Rainy
Great Slave	Saint Clair
Huron	Superior
Lake of the Woods	Winnipeg
Manitoba	Winnipegosis

MOUNTAINS

Cascade Range	Rocky Mountains
Hooker, Mount	Saint Elias Moun-
Laurentian Moun-	tains
tains	Selkirk Mountains
Robson, Mount	

DISTRICTS

Assinibola	Klondike
Athabaska	Labrador
Franklin	Mackenzie
Keewatin	Ungava

POLITICAL DIVISIONS

Alberta	Ontario
British Columbia	Prince Edward
Manitoba	Island
New Brunswick	Quebec
North West Terri-	Saskatchewan
tories	Yukon
Nova Scotia	

RIVERS

Assiniboine	Ottawa
Athabaska	Red River of the
Chaudiere	North
Churchill	Restigouche
Columbia	Saguenay
Fraser	Saint John
Gatineau	Saint Lawrence
Kootenay	Saskatchewan
Mackenzie	Stikine
Miramichi	Yukon
Nelson	

LAW AND GOVERNMENT

Admiralty Court of	Parliament
Canada	Premier
Cabinet	Privy Council
Exchequer Court of	Province
Canada	Royal Canadian
Executive Council	Mounted Police
Governor-General	Savings Bank,
Judicial Department	Canadian
of Canada	Supreme Court of
Legislative Assembly	Canada
Lieutenant-Governor	Territory
Money, in Canada	

HISTORY

Acadia	Lundy's Lane, Battle
Aix-la-Chapelle,	of
Treaties of	Quebec, Battle of
British North America	Quebec Resolutions
Act	Quebec Tercentenary
Clayton-Bulwer	Red River Rebellion
Treaty	Revolutionary War in
Dominion Day	America
Empire Day	Rupert's Land
Flags of the British	Saskatchewan Re-
Empire	bellion
Fort Niagara	Thames River, Battle
French and Indian	of the
Wars	Union, Act of
Hudson's Bay	Webster-Ashburton
Company	Treaty
Jay Treaty	World War
Louisburg, Sieges of	

Outline of Canadian History

I. Discovery, Exploration and Settlement

- (1) Age of discovery, 1000-1603
 - (a) Norsemen
 - (b) John and Sebastian Cabot
 - (c) Cortereal and Verrazano
 - (d) Jacques Cartier
 - (1) Sailed up the St. Lawrence
 - (2) Three voyages
 - (2) Age of exploration and settlement, 1603-1663
 - (a) Settlement of Acadia, 1604
 - (1) Established by the French
 - (2) Destroyed by the English
 - (3) Changes in ownership
 - (b) Founding of Quebec, 1608
 - (1) Explorations of Champlain
 - (2) Champlain and Indian wars
 - (3) Progress of the settlement
 - (c) Founding of Montreal, 1642
 - (d) The work of the missionaries
 - (1) As pioneers and explorers
 - (2) Among the Indians
 - (e) The Hundred Associates
 - (1) Monopoly of fur trade
 - (2) Bringing of settlers
 - (f) Internal strife
 - (g) Indian raids
 - (3) Canada becomes a royal colony of France, 1663
 - (a) Opposing interests of
 - (1) Priests
 - (2) Traders
 - (3) Royal governor
 - (b) Comte de Frontenac
 - (c) Opening of the interior, 1670-1682
 - (1) Explorations of Marquette and Joliet
 - (2) Voyages of La Salle
 - (3) Hudson's Bay Company founded, 1670
 - (d) Social and economic conditions
 - (1) Despotic government
 - (2) Trade controlled by great companies
 - (3) Feudalism
- ### II. The Struggle for New France (see French and Indian Wars)
- (1) Queen Anne's war, 1697-1713
 - (a) Attacks on English colonists
 - (b) Capture of Port Royal
 - (c) Acadia and Newfoundland ceded to England, 1713
 - (2) King George's war, 1744-1748
 - (a) Only a part of the struggle between France and England
 - (b) Capture of Louisburg
 - (c) Treaty of Aix-la-Chapelle; Louisburg restored to France
 - (3) The fall of New France
 - (a) Braddock's march
 - (b) Exile of the Acadians

(c) Siege and capture of Louisburg

(d) Capture of Quebec

(e) Minor battles

(1) Siege of Ticonderoga

(2) Niagara taken by the English

(3) Montreal surrenders

(f) Peace of Paris, 1763

(1) End of French rule in North America

(2) New France becomes an English colony.

III. The Early Years of British Rule, 1763-1815

- (1) Problems of organization and control
 - (a) Military rule
 - (b) Conspiracy of Pontiac
 - (c) The Quebec Act, 1774
 - (1) Enlarged the province
 - (2) Provided government by the governor and council
 - (3) French civil law, the law of the province
 - (d) The Constitutional Act 1791
 - (1) Divided Quebec into Upper and Lower Canada
 - (2) Provided governor, executive council and two legislative bodies for each province
 - (3) All officials appointed and dismissed by the home government
 - (e) The failure of representative government as established
 - (1) Opposing interests of the Assembly and councils
 - (2) The Assembly practically without power
 - (2) Opening of the West
 - (a) Development of the fur trade
 - (b) Rivalry of the fur companies
 - (c) Exploration
 - (d) Lord Selkirk's scheme
 - (e) Union of the fur companies
 - (3) The war of 1812-1814
 - (a) Causes
 - (b) Campaigns and battles
 - (c) Results
- ### IV. The Struggle for Responsible Government, 1815-41
- (1) The issues
 - (a) Demand of the Assembly to control the revenue
 - (b) Responsibility of the executive
 - (2) Popular leaders
 - (a) Louis Joseph Papineau
 - (b) William Lyon Mackenzie
 - (c) Robert Baldwin
 - (d) Egerton Ryerson
 - (e) Joseph Howe
 - (f) Louis H. La Fontaine

(3) Rebellion and reform

(a) Rebellions

- (1) Papineau and Mackenzie
- (2) Quickly suppressed
- (3) Caused popular reaction against reform
- (4) Led to appointment of Lord Durham as governor-general

- (a) Durham's report
- (b) Act of Union, 1840; in effect, 1841

(b) Reform in New Brunswick

- (1) Executive and Legislative Councils separated
- (2) Conditional control of revenue granted Assembly

(c) Nova Scotia

- (1) "Twelve resolutions" by the Assembly and submitted to the British Government, 1837
- (2) Some desired changes in government granted
 - (a) Separation of the two legislative bodies

(h) Partial control of public funds by Assembly

- (3) Principle of responsibility to the Assembly not yet allowed

(4) Triumph of responsible government, 1841-48

- (a) The first union Parliament
- (b) Lord Elgin puts the principle into operation
- (c) After several years in force in other provinces

(5) Fruits of responsible government

- (a) Control of appointments, crown lands and public funds
- (b) Provinces free to regulate their own tariffs
- (c) Establishment of a system of municipal government, 1849
- (d) Abolition of seigniorial tenure
- (e) Secularization of Clergy reserves, 1854
- (f) Reciprocity treaty with the United States, 1854
- (g) The legislative Council of Canada made elective
- (h) Government established in British Columbia

V. Confederation

(1) Movement for union

(a) In the Canadas

- (1) The coalition ministry in favor
- (2) Caused by friction between the sections

(b) Charlottetown Conference

- (1) For union only of the Maritime Provinces
- (2) Confederation overshadowed local issues

(3) Decided to hold general conference at Quebec

(c) Quebec conference, representing Canada, New Brunswick, Nova Scotia, Prince Edward Island, Newfoundland

(1) "Fathers of Confederation"

- (a) Sir John A. Macdonald
- (b) Hon. George Brown
- (c) Sir Georges Etienne Cartier

(d) Sir Etienne P. Taché

(e) Sir Alexander T. Galt

- (f) Hon. Thomas D'Arcy McGee, Sir Oliver Mowat, Sir Charles Tupper, Sir Adams G. Archibald, Sir Leonard Tilley,

(2) The Quebec resolutions

- (a) In favor of union
- (b) Plan of government mapped out
- (c) Referred to provinces
- (d) Reciprocity treaty ended Fenian raids

(2) British North America Act

(a) Passed by the British Parliament in March, 1867

(b) Terms of the Act

- (c) In effect on Dominion Day, July 1, 1867; Ontario, Quebec, Nova Scotia and New Brunswick included in Dominion.

VI. Growth and Expansion

(1) Development of the west

(a) Hudson's Bay Company surrenders its territorial rights

(b) North West territories

(1) Northwest rebellion

(2) Royal Northwest Mounted Police

(c) Manitoba (1870) and British Columbia (1871) join the Dominion as provinces

(d) Prince Edward Island enters Confederation (1873)

(e) Transcontinental railway

(2) Industrial and commercial progress

(3) Foreign affairs

VII. The Twentieth Century

(1) Internal development

(a) Territorial changes

(1) Alberta and Saskatchewan become provinces

(2) Yukon organized

(3) Ontario, Quebec and Manitoba enlarged

(b) Transportation

(c) Industries

(d) Education

(e) Political affairs

(1) Important legislation

(2) The Borden government

(3) The World War

(2) Canada's position as a nation

Outline on The Dominion of Canada

I. Location and Extent

- (a) Latitude
- (b) Longitude
- (c) Boundaries
- (d) Area
- (e) Comparison with other countries

II. Surface and Drainage

- (a) Coastal plain
- (b) Appalachian highlands
- (c) Great central plain
- (d) Rocky Mountain highlands
- (e) Pacific slope
- (f) River systems
- (g) Lakes

III. Climate

- Natural conditions expected
- (b) Changes wrought by physical conditions
- (c) Average temperature
 - (1) Maritime provinces
 - (2) Ontario and Quebec
 - (3) Northwest provinces
 - (4) Pacific slope
 - (5) Yukon
- (d) Average rainfall in various sections
- (e) Need for irrigation
 - (1) Extent of irrigation service

IV. Industries

- (a) Mineral resources
 - (1) Gold and silver
 - (2) Iron, copper, coal, lead, etc.
 - (3) Oil
 - (4) Granite and building stone
 - (5) Where each is found
- (b) Agricultural products
 - (1) Cereals
 - (a) Wheat
 - (b) Oats
 - (c) Rye
 - (d) Barley
 - (e) Alfalfa
 - (f) Corn
 - (g) Other grains
 - (2) Fruits
 - (a) Apples
 - (b) Peaches
 - (c) Pears
 - (d) Berries
 - (e) Value of annual crop
 - (f) Provinces leading in production
 - (3) Market gardening
 - (4) Live stock and dairy products
 - (a) Great grazing sections
 - (b) Packing-house centers
 - (c) Domestic and foreign markets
 - (d) Creameries
 - (e) Milk and butter
- (c) Manufactures
 - (1) Natural locations of districts
 - (2) Leading industries
 - (a) Food products

- (b) Textiles
- (c) Iron and steel
- (d) Lumber
- (e) Leather and leather goods
- (f) Paper and printing
- (g) Rank with other nations

(d) Commerce

- (1) Domestic commerce
 - (a) By rail
 - (b) By water
 - (1) Inland water routes
- (c) Coasting trade
 - (1) Nations which compete for carrying trade
 - (a) Proportion of foreign vessels
 - (b) Reasons for Canadian proportion
 - (2) Principal coast trade routes
- (2) Foreign commerce
 - (a) With what countries
 - (b) Value of annual exports
 - (c) Value of annual imports
 - (d) Principal countries engaged in carrying trade

V. Population

- (a) Per cent of annual increase
- (b) Center of population
 - (1) Rate of progress westward
 - (2) Density of population
- (c) Comparative growth of cities and rural communities
- (d) Immigration
- (e) Races and colors represented

VI. Government

- (a) General character
- (b) Departments
 - (1) Executive
 - (a) Governor-general
 - (b) Cabinet
 - (2) Legislative
 - (a) Parliament
 - (1) Senate
 - (2) House of Commons
 - (3) Judicial
 - (a) Supreme court
 - (b) Courts of limited jurisdiction
 - (1) Exchequer court
 - (2) Admiralty court
- (c) Provincial governments
 - (1) In what ways sovereign
 - (2) In what ways subordinate
- (d) Territories

VII. Education in Canada

VIII. Cities

- (a) List of twenty-five largest
- (b) Forms of government
 - (1) Commission form
 - (2) Large elective list of officers

IX. History. See Outline of Canadian History.

Questions on Canadian History

When and where are the Norsemen said to have landed about A. D. 1000?

Who was Leif Ericsson?

Who were the Cabots, and why are they famous?

Why were the explorations of Cartier important?

When was Acadia settled? By whom?

When was Quebec founded? Who was the founder? Give a brief account of his work as a pioneer.

What were the conflicting internal interests which threatened the existence of the colony?

Name three explorers, not already mentioned, who traveled through the interior of the New World.

Give a brief account of the discovery of Hudson's Bay.

When and by whom was Montreal founded?

When did the Hudson's Bay Company receive its charter? What can you say of the influence this company has exerted on Canadian history?

Who discovered the Mississippi River? When did La Salle reach its mouth?

What is meant by the expression, "the struggle for New France?"

Summarize the principal incidents of King William's War. What were its most important results?

Show as well as you can the connection of these wars in America with general European history.

Explain General Wolfe's plan for the capture of Quebec. What was the importance of his victory?

Who was Pontiac? What was the purpose of the great conspiracy?

What were the important provisions of the Quebec Act?

When was Canada divided into Upper and Lower Canada? By what name is this Act known?

Outline the method of government at that time.

What can you say about the explorations of Sir Alexander Mackenzie?

Why was the fur trade instrumental in opening the West?

What were the causes of the War of 1812?

Name several important victories won by General Brock.

Who was Laura Secord?

Explain briefly Canada's position in the War of 1812.

What were the leading issues in the struggle for responsible government?

Name four popular leaders of the movement.

Who was the Earl of Durham? What was the importance of his famous report?

When was the Act of Union passed?

When did it go into effect?

Who was Lord Elgin?

Name six "fathers of Confederation."

What were the Quebec resolutions?

What did they propose? How were these resolutions put into effect?

Who was the first Premier of the Dominion?

When was the British North America Act passed? What is the anniversary of the day on which it came into effect?

What was the cause of the Red River Rebellion? Of the Northwest Rebellion? Who was the leader of both?

When did Manitoba and British Columbia become provinces?

When was the Royal Northwest Mounted Police organized? Outline the duties of this force.

When did Sir Wilfrid Laurier become Premier? Name some of the important events of his administration.

When was Queen Victoria's diamond jubilee celebrated?

Give a brief account of the Quebec Tercentenary Celebration.

What was the principal issue in the election of 1911? Of 1917?

Name the last two Governors-General.

How many soldiers did Canada send to the World War?

What provision was made for support of soldiers returned from Europe?

To what extent did Canada make munitions during the war?

Who commanded Canada's forces on Europe's battlefields?

CANADA BALSAM, *baw'l'sam*, a resinous substance obtained from the Balm of Gilead fir, common in Canada and the United States. It is used in medicine and in making



CANADA THISTLE

varnishes, and because of its almost perfect transparency, in the preparation of objects for the microscope. This balsam is also utilized as a cement for joining the lenses of optical instruments. It has an odor similar to that of turpentine and is quite bitter to the taste.

CANADA GOOSE, an American wild goose, common in temperate North America. Its breeding grounds are the regions between the Yukon valley and Indiana. It is from thirty to thirty-six inches long, is brownish above and lighter below, with head, neck, bill and feet black and with a white patch over each cheek. In early spring Canada geese may be seen flying north at a considerable distance above the earth in a > shaped flock. At their heads is a leader, an old gander, who directs the flight, and the others following may often be heard giving their loud, coarse "honk" as they fly past.

CANADA THISTLE, one of the most common and injurious of all weeds, introduced into the United States and Canada through the medium of imported grains. It grows from the latitude of Newfoundland south to that of Virginia, propagating itself by seeds and by its creeping roots. It bears purplish flowers about three-quarters of an inch in diameter, within the tubes of which is formed a nectar which lures the bees, butterflies and other insects. These carry away from the flowers innumerable pollen grains, and thus aid in the distribution of the plant. This weed grows very freely in large open fields and among various kinds of grains. To prevent the growth of the Canada thistle, diligent cultivation of the land and alternate sowing of heavy, hardy crops are necessary. Infested fields are sometimes cleared of the pest by sheep which graze upon the land.

CANA'DIAN RIVER, a river that rises in the northeastern part of New Mexico and flows easterly through Texas and Oklahoma and unites with the Arkansas at Tamaha. It forms a part of the former boundary between Oklahoma and Indian Territory, and is the most important tributary of the Arkansas. The quantity of water it carries varies greatly at different seasons. Its length is 900 miles.



CANAL. The rôle taken by canals in the history of civilization is similar to that taken by the railroads, but canals antedated railroads by many centuries. Originally, no doubt, men made artificial waterways to help irrigate the land, but the difficulties encountered in traversing deserts, mountains, etc., led them to see the value of transportation canals, and such thoroughfares were built long before the Christian Era.

There is a tradition that the Egyptians constructed a canal across the Isthmus of Suez before 2000 B. C., a predecessor of the modern Suez waterway. About 600 B. C. Nebuchadnezzar opened the royal canal between the Tigris and the Euphrates rivers. While we have no direct evidence of the fact, it is supposed that the Chinese were familiar with canals long before they were

known in Europe, and the Grand Canal, completed by them in the thirteenth century, is the first work of its kind after the beginning of the Christian Era. The Romans constructed many canals for navigation, and these may be considered the origin of the present canal systems of Europe.

How Canals are Constructed. This article deals only with transportation canals. For other kinds see the articles DRAINAGE, IRRIGATION and DRAINAGE CANAL, CHICAGO.

Canals are of necessity excavated on a level and cannot be adapted to a change in surface by grades, as can railroads. When the route traversed is so uneven that the construction of the canal on one level will involve too great expense, it is constructed on two or more levels called *reaches*, and each reach is connected with those above or below by the means of *locks*, *inclines* or *lifts* (see Lock). All canals are constructed on practically the same plan. When the excavation is in soft earth, the banks slope and the channel is wider at the surface than at the bottom. When excavated in rock, the banks are usually perpendicular, or nearly so. Canals are carried across valleys on embankments or aqueducts, and culverts are constructed to carry streams below them. The top of the embankment is fashioned into the channel, which is lined with cement, but in case a bridge is used the structure serves as the support of a channel, which is constructed of steel or of wood and may or may not be lined with cement. The construction of a canal often necessitates works of great magnitude, such as deep cuts, high embankments, tunnels and aqueducts, and on account of the expense entailed most canals are government works.

Canals vary in size from a small ditch, excavated to connect two bodies of water, to channels that will float the largest ocean steamships such as the Panama Canal. Those which are constructed for large steamers are known as *ship canals*. In general the bottom of the canal should be twice as wide as the widest boat that is to navigate the channel, and the depth of water should exceed the draft of the largest boats by at least one and one-half feet, since it requires less power to move a boat through a canal having an abundant supply of water than through one whose channel is just large enough to admit of the passage of the boat.

American Canals. The first canal in the

United States was constructed around the falls in the Connecticut River at South Hadley, Mass., in 1793. Washington and other leading statesmen early saw the advantages of canals to connect the interior of the country with the Atlantic and with adjoining navigable rivers; yet it was a long time before any extended works were attempted. The Erie Canal, completed in 1825, was really the first enterprise in the country worthy of note.

In 1917 construction work was completed on the enlarged Barge Canal, of which the Erie Canal is an important link. Though canal building suffered a decline after the Civil War, between 1825 and the war a number of waterways were completed, including the Chesapeake and Ohio (1850), between Washington, D. C., and Cumberland, Md.; the Illinois and Michigan Canal (1848), between Chicago and La Salle, Ill.; and the system of locks at Sault Sainte Marie, Mich. (1855). All of these are described in these volumes under their proper headings.

The Hennepin Canal, connecting the Illinois and Mississippi rivers, was started in 1892 and completed in 1908, but canal building was practically at a standstill in the United States during the period of rapid railroad expansion. Since 1900, however, there has been renewed activity. The completion of the New York canal system, already referred to, was one of the most notable feats in this field of activity. The year 1914 saw the completion of a canal across Cape Cod, a third great lock at Sault Sainte Marie, and, most important of all, the great waterway across the Isthmus of Panama.

The following year work was begun on a fourth great lock at Sault Sainte Marie, and operations were completed on a canal around the Dalles Rapids, on the Columbia River. The new Sault lock was completed in 1918. In 1917 the Lake Washington Canal, between the lake and Puget Sound, was opened to navigation. In 1929 canalization of the Ohio River from Pittsburgh to Cairo was completed. After America entered the World War the subject of transportation by water became an important issue in view of the railroad congestion, and great effort was made to utilize to the fullest extent the country's great system of inland waterways.

European Canals. Canal construction has made rapid progress in Europe since the

twelfth century. By 1250 the "low countries" were traversed by an elaborate system of artificial waterways, and to-day Holland has over 2,400 miles of canals and Belgium about 1,345 miles. The French system has an aggregate mileage of about 3,000, and in 1917, after three years of devastating warfare, plans were being laid for a further extension of the system. Among the notable French canals are the Languedoc, joining the Bay of Biscay and the Mediterranean Sea, and the Canal du Nord, connecting Paris and the Lille district.

Out of a total of 7,038 miles of navigable waterway in Germany, 5,815 miles are natural. The most important German canal is the Kaiser Wilhelm, or Kiel, connecting the Baltic and the North seas. During the World War this canal served as a harbor for the Grand Fleet. Both in France and in Germany extensive use is made of canalized rivers. Until 1928 the great city of Marseille, France, had no connection with the country's admirable canal system. A tunnel was cut through the mountain back of the city, and a canal now connects the city with the River Rhone and thus with the nation's system. The cost was 135 million francs. Russia and Austria also have canal systems of considerable local importance, and in Greece is the famous Corinth Canal, across the isthmus which connects Northern Greece and the Peloponnesus.

Of the British canals the most notable is the Manchester Ship Canal, extending from Manchester to the estuary of the Mersey River. Others of importance include the Grand Canal, between Dublin and Ballinasloe; the Caledonian Canal, extending across Scotland; and the canal between the firths of Forth and Clyde.

Related Articles. Consult the following titles for additional information:

Caledonian Canal	New York State
Canals of Canada	Barge Canal
Cape Cod Canal	Panama Canal
Erie Canal	Sault Ste. Marie Canal
Manchester Ship Canal	Suez Canal
	Welland Canal

CANALS OF CANADA. The Canadian Government operates six canal systems in connections with navigable lakes and rivers; they are as follows:

1—Between Montreal and Fort William and Port Arthur.

2—From Montreal to the International border near Lake Champlain.

3—From Montreal to Ottawa via Ottawa River.

4—From Ottawa to Kingston via Rideau River and lakes.

5—From Trenton, Lake Ontario, to the Georgian Bay.

6—From the Atlantic Ocean to Bras d'Or Lakes, Cape Breton.

The St. Lawrence, with the system of canals and the various lakes, affords a direct line of water communication from Montreal to Port Arthur or Fort William, at the head of Lake Superior, a distance of 1,250 statute miles. The distance to Duluth is 1,354 miles, and to Chicago, 1,268 miles. Ocean-going steamers may ascend the river as far as Montreal in the open season of navigation; from Montreal westward are eight canals—the Lachine, Soulanges, Cornwall, Farran's Point, Rapide Plat, Galops, Welland and Sault Ste. Marie, generally known as the Soo. The aggregate length of these canals is seventy-three miles; the total lockage (that is, the height directly overcome by locks) is 551 feet. The number of locks through which a vessel passes in its voyage from Montreal to Lake Superior is forty-eight. These are the canals on what may be called the main line.

The new Welland Ship Canal was completed in 1931 and formally opened to traffic in 1932. It is an important link in the proposed St. Lawrence Waterway.

A brief statement of the principal facts of interest in regard to each of the important canals is given below.

The St. Lawrence and Great Lakes System

1. **Lachine**, from Montreal to Lachine. Length 8.74 miles; 5 locks, length 270 ft., width 45 ft., depth 14 feet.

2. **Soulanges**, Cascades Point to Coteau Landing. Length 14.67 miles; 5 locks 280 feet long, 45 wide, 15 deep.

3. **Cornwall**, Cornwall to Dickinson's Landing. 11 miles long; 6 locks, 270 feet long, 44 wide, 14 deep.

4. **Farran's**, at Farran's Point Rapids. 1.28 miles long; one lock, 800 feet long, 50 wide, 16 deep.

5. **Rapide Plat**, Rapide Plat to Morrisburg. 3.89 miles long; 2 locks, 270 feet long, 45 wide, 14 deep.

6. **Galops**, Iroquois to Cardinal. 7.36 miles long; 3 locks, 270 feet long, 45 wide, 14 deep.

7. **Welland**, between Lakes Ontario and Erie. See Welland Canal.

8. **Sault Ste. Marie**, St. Mary's Rapids between Lake Huron and Lake Superior. 1.38

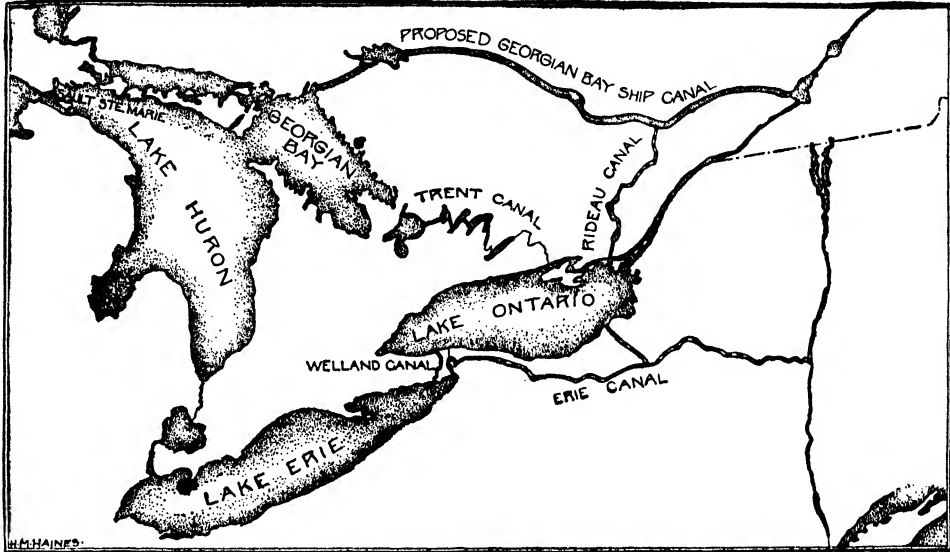
miles long; one lock 900 feet long, 60 feet wide, 18½ feet deep. See Sault Ste. Marie Canal.

Ottawa River System. There are three locks each 200 feet long, 45 feet wide, and 9 feet deep. St. Anne's at the junction of the St. Lawrence and Ottawa Rivers.

Carillon overcomes the Carillon rapids in the Ottawa River and the Grenville overcomes the Long Sault rapids.

Chambly-Lake Champlain System, from Sorel to Chambly, thence to St. Johns by the Chambly Canal and up the Richelieu River to Lake Champlain. From Sorel to the international boundary is a distance of 199 miles. The Chambly Canal is 12 miles long, has 9 locks of varied sizes and a total lockage of 74 feet.

Saint Peter's Canal, connecting Saint Peter's



PRINCIPAL CANALS OF CANADA AND THE ERIE CANAL

The Rideau Canal is 126¼ miles long with a seven mile branch to Perth. There are 49 locks. Their length is 134 feet, width 33 feet, and depth 5-6 feet.

The Trent Valley Canal uses a series of natural waterways from the Bay of Quinte to Georgian Bay. The distance is 203½ miles. There are 42 locks varying in length from 100 to 175 feet, 33 feet wide and from 6 to 8 feet deep. At Kirkfield there is a hydraulic lift lock 45 feet high. At Peterborough there is one 65 feet high, the second largest of its kind in the world. There is a branch 35 miles long, with one lock connecting Sturgeon Lake with Lake Scugog.

Richelieu River or Lake Champlain System. One lock at St. Ours, Quebec; 339 feet long, 45 feet wide and 12 feet deep.

Chambly, Chambly to St. Johns, Quebec. 11.76 miles long; 9 locks 120½ feet long, 23¼ feet wide, 6½ feet deep.

St. Peters, St. Peters Bay to Bras d'Or Lakes. It is half a mile long, with one lock 300 feet in length, 48 feet wide and 18 feet deep.

St. Andrews, overcomes the rapids on the Red River fifteen miles north of Winnipeg. The lock is 215 feet long, 45 wide and 17 deep.

Murray Canal. Length 5½ miles; width at bottom, 80 feet; width at water surface, 120 feet; depth below lowest known lake level, 11 feet; no locks.

Bay, on the southern side of Cape Breton, with the Bras d'Or lakes. It is about 2,400 feet long and 55 feet wide, has one tidal lock 200 by 48, four pairs of gates, and a minimum depth of 18 feet.

CANAL ZONE. See PANAMA CANAL.

CANARY, *kanu'ri*, a small finch, originally from the Canary Islands and Madeira, but introduced into Europe several hundred years ago. It is the most popular of all cage birds because of its cheerful singing and friendly nature. Canaries have been bred in captivity so long that many remarkable varieties have developed, scarcely resembling the greenish little bird of Madeira. The topknots of some, the long, slender shapes of others, the yellows, browns, reds and blacks seen in their plumage are all unnatural. The Scotch fancy canary, with his long, slender, curved body, bent almost to a semicircle, is one of the strangest results of breeding.

In the Harz Mountains and other parts of Germany and in the British Islands, the raising of canaries is quite an important industry, and large prices are paid for the highest type of singing birds. In the United

States a good bird has been bought for a dollar, but sometimes \$150 has not been considered too high a price to pay for an especially fine singer. The birds require a clean cage, good seed, some green food, lime and plenty of cold water. Beyond this they need little care and thrive almost anywhere. In the United States the name *wild canary* is often given to the American goldfinch, or thistle bird, which, though entirely different, does somewhat resemble the captive canaries. See AMERICAN GOLDFINCH; BIRDS, *color plate*, *Common American Songsters*, Fig. 3.

CANARY ISLANDS, or **CANARIES**, a cluster of islands in the Atlantic Ocean, about seventy miles west of the northwest coast of Africa. They belong to Spain and are so called from the word *Canaria*, derived from *canis*, the Latin for *dog*. When the group was discovered a breed of fierce dogs inhabited the islands, and may have suggested the name. It is also said that it refers to the shape of the largest island. They are thirteen in number, seven of which are of considerable size: Palma, Ferro, Gomera, Teneriffe, Gran Canaria, Fuerteventura and Lanzarote. All are volcanic, rugged and mountainous, frequently presenting precipitous cliffs to the sea. The principal peak is that of Teneriffe, 12,182 feet. The area of the whole has been estimated at 2,807 square miles. The fine climate and the fertility, which owes little to cultivation, justified the ancient name of *Fortunate Islands*. There are no rivers of note. The exports consist of cochineal, wine, raw silk and fruits.

CANARY SEED, the seed of the canary grass. The seed is used as food in the Canaries, Barbary and Italy. It has been successfully cultivated in England and the European continent, where it is used extensively as a food for cage birds.

CANCELLATION, *kan sel la'shun*, in mathematics the process of striking out equal factors in the dividend and the divisor. It is based upon the following principles:

(1) Both dividend and divisor may be divided by the same number, and the quotient is unchanged; or, a common factor may be dropped from dividend and divisor and the quotient remains unchanged.

(2) The numerator and denominator may be divided by the same number and the value of the fraction remains unchanged; or, a common factor may be dropped from numerator and denominator and the value of the fraction remains unchanged.

Cancellation is of advantage in shortening the processes involved in multiplication and division, as in the following:

$$\frac{\overset{2}{8} \times \overset{2}{3} \times 9}{\underset{2}{4} \times \underset{2}{6} \times \underset{2}{18}} = \frac{2}{4} = \frac{1}{2}$$

CANBERRA, *can'berra*, the Federal Capital of the Commonwealth of Australia, situated on a high plateau about 200 miles southwest of Sydney. Its area is 912 square miles, acquired from the State of New South Wales in 1911. The first stone of the new capitol was laid in 1913. War delayed the work, but in May, 1927, the provisional legislative buildings were dedicated by the Duke of York, and Parliament opened its first session in its new home. The plan of the capital city was laid out by Walter B. Griffin, an American architect-engineer, and is modeled somewhat on that of Washington, D.C. Population, 1934, 9,350.

CANCER, *kan'ser*, the common name of a disease characterized by the formation of a malignant tumor in some part of the body. A high death rate from cancerous growths is common in all parts of the world among civilized peoples, for cancer most often attacks those who enjoy life's comforts and luxuries. It is decidedly a disease of middle age and old age, rarely afflicting persons below forty. It is believed by some authorities to be of bacterial origin, but on this point no definite proofs have as yet been established. Certain it is that medical authorities have sought long and vainly for a cure for cancer, and health authorities are yearly printing statistics showing the appalling number of deaths due to the disease. It is taxing the best brains and baffling the highest skill in the medical profession.

Certain characteristics are common to all forms of cancer. The growth is always composed of a framework of fibers surrounding a mass of cells and a milky-white cancer juice. Cancerous growths have no set limits, but may pass into surrounding tissues. They tend to spread by means of the veins and lymphatics. Almost one-half of all cancer cases occur in the intestines and the stomach, a fact that ought to impress everyone with the importance of eating moderately and selecting well-cooked, wholesome food. Outside surfaces exposed to injuries and to dirt are more often attacked than protected parts. Cancer of the lip, of

the tongue, and of the inside of the mouth are common in men, and cancer of the breast frequently attacks women. Local irritations, such as might be caused by a pipe stem, or any hard object rubbing against the body, often develop into cancers.

So far as has been discovered, removal of a cancer by the knife is the most reliable form of treatment. A growth in its first stages can nearly always be removed, and the patient may recover his health completely. Delay is the greatest enemy in the history of a cancer case. Any open sore or hard lump that seems persistent should have the attention of a good physician. Very often the incipient cancer is not painful, but this should not lull the victim into a sense of false security. In other cases much harm is done by the use of patent medicines that bring temporary relief from pain and permit the growth to develop until it is too late to cure it. Cancer of advanced stage cannot yet be cured.

Of recent years much has been heard about the X-ray and radium forms of treatment. The beneficial effects of these methods are limited to superficial skin cancers and to certain forms of tumor that are not malignant. Internal cancers are rarely benefited by either the X-ray or by radium, and the excessive cost of the latter makes it unavailable for nearly everyone. See X-RAY.

CANCER (the crab), the fourth sign of the zodiac, entered by the sun on or about the twenty-first of June and quitted a month later. The symbol is ♋. The constellation of Cancer is no longer in the sign of Cancer, but at present occupies the place of the sign of Leo (see ZODIAC). The Tropic of Cancer is the name given to the northern tropic. See TROPICS.

CANDLE. Candles are made by running tallow, wax, spermaceti or paraffin around a wick. There are two processes in candle making, dipping and molding, but the latter is the more common. In large manufacturing, machinery is employed in molding as well as in dipping. *Wax candles* are seldom molded, on account of their adhesion to the molds and their contraction in cooling. A different method of manufacture, termed *basting*, is accordingly resorted to. Wax candles are still employed in the Catholic and Greek churches, as indispensable accessories of the altar. *Sperm candles* are composed of spermaceti mixed with beeswax.

Paraffin candle manufacture is now carried on on a most extensive scale. Paraffin candles are much in demand on account of their cheapness and the clearness and brilliancy of their light. The Indians of Alaska make candles of a fish called the *candlefish* (which see).

CANDLEBERRY, WAX TREE, or WAX MYRTLE, a shrub growing from four to eighteen feet high, and common in North America, where candles are made from its small berries. These are covered with a greenish-white wax, popularly known as bayberry tallow. The wax is collected by boiling the berries in water and skimming the surface. A bushel of berries yields from four to five pounds of wax.

CANDLEFISH, a sea fish of the salmon family, of about the size of the smelt, frequenting the northwestern shores of America. It is converted by the Indians of Alaska into a candle, simply by passing the pith of a rush or a strip of the bark of the cypress tree through it as a wick, when its extreme oiliness keeps the wick blazing. The oil is sometimes extracted and used as a substitute for cod-liver oil. Though the fish is very oily its flesh has an agreeable flavor, and the oil itself is not unpleasant.

CANDLEMAS, a Church feast, instituted in 492 in commemoration of the presentation of Christ in the temple and of the purification of Mary. It falls on February 2, and on this day, among Roman Catholics, lighted candles are carried about in procession, and all candles and tapers which are to be used in the churches during the entire year are consecrated. The feast is retained by the Anglican Church and is also observed by the Lutherans.

CANDY AND CANDY MAKING. The term *candy* is applied to a wide variety of preparations having sugar as their chief ingredient. There are also added nuts, fruits, coloring matter, flavoring extracts, etc., and glucose is usually employed to give the proper consistency. It is an interesting fact that candy making developed from the old custom of using sugar and honey to conceal the disagreeable taste of medicines. Previous to the nineteenth century sugar-coated pills and other medicated candies were the only sweetmeats known, but candy making as an independent industry has now reached a position of great importance. In the United States and Canada the output in

average years is valued at over \$500,000,000. During the years when national prohibition was in effect in the United States, there was reported a great increase in candy consumption.

The question as to the harm which candy does to the health is an important one, because candy eating is a widespread habit. Physicians agree that pure candy eaten occasionally after a meal is not only harmless but wholesome, as a certain amount of sugar is good for the system. It is the indiscriminate and excessive use of candy which harms the digestion and leads to biliousness and similar ills. Children especially should be kept from immoderate candy eating, for it harms not only the stomach but the teeth. Children should never be permitted to buy cheap, highly colored confectionery.

Candy Making. The factory processes of making candy are very interesting. The sugar and glucose composition is boiled in water until the syrup is thick and almost clear. This syrup is then poured out upon huge marble slabs, where it is allowed to cool for a time. It is then worked by means of long iron paddles, much as a plasterer would stir mortar. Under this treatment it becomes hard, white and almost crystalline. This process is sometimes carried on in copper kettles, which not only cook the ingredients, but beat them white and hard by means of a rotating dasher. The candy is now ready to be cast into various sizes and shapes. Candy is cast in cornstarch molds. The starch is placed in narrow, shallow boxes and smoothed off at the top. The boxes are run under a press, the lower part of which is covered by projections of just the size required. When the press goes down, a little hammer taps the top of it automatically, and the cornstarch is punctured with rows of smooth, clear-cut holes. When the molds are complete, they are filled from a tank with cream candy. Marshmallows are cast in the same way. When the candy in the molds is dry and hard, the boxes are taken to a machine called the "starch-buck." Here the starch and candy are dumped into a hopper, under which is a series of sieves. The starch falls through the meshes, and the candy is carried on through a series of brushes to take off the remaining starch.

Chocolate creams are dipped by means of a little wire spoon, after which they are placed on a piece of oilcloth and set in a frame

to dry. For the manufacture of lozenges and candy hearts, the sugar is mixed cold in large tubs, and the lozenges are pressed out in molds. Mottoes are printed on the hearts with a rubber stamp. For cocoanut candy, the nuts are bought whole, and the hard, white meat is taken out and placed in a kettle, where it is boiled and violently stirred at the same time, by means of rotating dashers. Sugar is added, and when the mass is sufficiently cooked it is placed on a marble slab and rolled down even with a long, cylindrical roller. Cocoanut is colored and molded into various forms and is sliced up in strips with a patent cutting machine. Caramels are made of sugar and pure cream, carefully boiled together until the product is of proper consistency, and then poured on marble slabs to cool. They are then cut and wrapped.

Hard candy is made of sugar boiled over an open fire and then colored in various shades. The batches are mixed and rolled out by hand until they are the size of an ordinary stick of candy, after which they are cut up into the regular lengths. Rock candy and many of the sugared nuts are made by crystallizing sugar. A tin box, in which numerous strings run from top to bottom, is filled with sugar and set away in a warm place. The crystals of sugar form on the strings and harden there, thus making the well-known rock candy. In the same way crystals are allowed to form on almonds and other nuts and fruit.

CANDYTUFT, a group of plants related to the mustard, three species of which are common in gardens. *Purple candytuft* is so called from its purplish flowers, which are borne in flat-topped clusters. There are four petals to a blossom. Like other members of the group, purple candytuft has petals of irregular formation, as the two inner are shorter than the outer ones. *Bitter candytuft* is notable for the medicinal properties of its root, stem, leaves and seeds. Its profuse growth of pure white flowers is the distinctive characteristic of the *evergreen candytuft*, a native of warm regions. The name of this plant group is derived from *Candia*, the old English name for the island of Crete. It was from this island that candytuft seeds were introduced into England.

CANE, a term sometimes loosely applied to any small and smooth rod, of the thickness of a walking stick or less; but more correctly

limited to the stems of the smaller palms and the larger grasses, used so extensively in making walking sticks, or *canes*. This is an example of the name of the material being applied to the thing made, as in the case of *cork*. Sugar cane and bamboo are examples of cane plants, and so, too, is rattan. To the rattan group belong the canes largely imported from the tropical regions of the East, for making bottoms of chairs and couches.

CANELLA, *WHITE*, a tree belonging to the West Indies, growing to a height of ten to fifty feet, with a straight stem, branched only at the top. It is covered with a whitish bark, which is freed from its outward covering, dried in the shade and brought to Europe in long quills, somewhat thicker than those of cinnamon.

CANFIELD, DOROTHY. See FISHER, DOROTHY CANFIELD.

CANIS MAJOR, *ka'nis ma'jer*, a constellation of the southern hemisphere, remarkable because it contains Sirius, or the Dog Star, the brightest of all stars. The name is Latin, and means *greater dog*.

CANKER, *kang'ker*, a painful sore which generally forms in the mouth, especially on the tongue. Ulcers are an indication of a disordered stomach, and are common ailments of children. Pulverized alum or silver nitrate is an effective remedy, but the former is preferable, as it is less irritating.

CANKERWORM, the destructive caterpillar (larva) of certain moths, very common in Northeastern United States and Canada. Cankerworms attack apple and pear trees, especially, though other trees suffer when the insects are numerous. The larvae appear at about the same time as the leaves, and they are voracious feeders. When disturbed they drop from the leaves and hang suspended on silk threads. If they reach the ground they must climb the trunk to resume their feeding. The female is compelled to climb the trunk in order to lay her eggs, and accordingly the defense against cankerworms is to surround the trees in spring time by bands of tarred paper, over which the insects cannot crawl. Paris green can be used safely on shade trees, but not on fruit trees.

CANNAE, *kan'nee*, ITALY, a town in the province of Bari, near the mouth of the Ofanto, formerly the Aufidus River. The place is of historical importance, because it was the scene of the battle in which the

Roman army sustained a terrible defeat by Hannibal in 216 B. C. The Romans numbered 80,000 infantry and 6,000 cavalry, whereas Hannibal's army consisted of 10,000 cavalry, but only about 40,000 infantry. Of the Romans 70,000 fell, including the consul Lucius Paulus and eighty men of senatorial rank. Hannibal lost not quite 6,000.

CANNIBAL, *kan'i bal*, a person who eats human flesh. The Spanish discoverers found that the practice of eating human flesh existed among the Caribs, a West Indian tribe now extinct, and the word came from their name. Since that time it has been found that the practice has existed among ignorant and barbarous tribes in all parts of the world, and it is probably not wholly extinct in remote sections of the East Indies.

In some instances cannibalism seems to have been of the nature of a religious rite, the victims being first sacrificed to a god and later eaten; but in many other cases the practice appears to have been rather the natural result of ferocity or to have originated in a natural demand for flesh. Early North American Indians sometimes ate the bodies of prisoners of war, and the Aztecs of Mexico consumed human bodies used as offerings to the war god. Even civilized men of to-day, in the extremity of hunger, may be driven to eat human flesh. In stories of shipwrecks and sieges many years ago such practices were reported.

CANNING, a process of preserving fruits, vegetables and meats, by enclosing them in air-tight cans. This process was discovered in 1795 by a Frenchman named Nicholas Appert, and it was introduced into the United States about 1815, though as an industry canning was not developed until some time after that date. The principle underlying canning is that the germ which causes fermentation must be killed or driven off from the articles in order to preserve them. Since heating always kills this germ, the articles are cooked either before or after being placed in the can.

Methods. Of four methods of canning now generally practiced, the *hot-pack* or *open-kettle* method is perhaps most common in the home. The food is boiled or sterilized in one kettle, and the jars, with caps and rubbers, in another. After the food is poured into the jars they are sealed. This

method does not, however, ensure perfect protection against the entrance of germs.

A more satisfactory process is the *three-day* or *fractional* method. This consists in boiling the food for three days, to destroy organisms that develop after the process has begun. The objections to it are the quantity of fuel needed, the amount of work involved and the waste of rubbers, which are destroyed by repeated boilings.

Gooseberries and other fruits containing a good deal of acid are sometimes packed into jars, and the jars then filled to overflowing with cold, sterilized water. This, the *cold-water* method, is not of great practicable value for it cannot be depended upon to succeed.

A successful and economical process used both by commercial and home canners is the so-called *cold-pack* method.

A serviceable cold-pack home canning outfit may be made of materials found in any household. All that is necessary is a vessel to hold the jars or cans—such as a wash boiler or a large tin pail. This vessel should have a tight-fitting cover. Provide a false bottom of wood or a wire rack to allow for free circulation of water under the containers. The wood bottom may be of perforated boards or of laths nailed to three cross-pieces. If the boiler is deep enough to accommodate two tiers of containers, place a rack on the tops of the lower row to support the top tier.

The cold-pack method of canning is so simple and the directions so easily followed that the average twelve-year-old girl may successfully can vegetables or fruits with it. The steps to be taken and the precautions which should be observed are as follows:

1. Select sound vegetables and fruits. (If possible can them the same day they are picked.) Wash, clean and prepare them.

2. Have ready on the stove, a can or pail of boiling water.

3. Place the vegetables or fruits in cheese-cloth, or in some other porous receptacle—a wire basket is excellent—for dipping and blanching them in the boiling water.

4. Put them whole into the boiling water. After the water begins to boil begin to count the blanching time.

5. The blanching time varies from one to twenty minutes according to the vegetable or fruit. When the blanching is complete remove the vegetables or fruits from the boiling water and plunge them a number of times into cold water, to harden the pulp and check

the flow of coloring matter. Do not allow to stand in cold water.

6. The containers should be thoroughly clean. It is not necessary to sterilize them in steam or boiling water before filling them, for the reason that in the cold-pack process both the insides of containers and the contents are sterilized. The jars should be heated before being filled in order to avoid breakage.

7. Pack the product into the containers, leaving about a quarter of an inch of space at the top.

8. With vegetables add one level teaspoonful of salt to each quart container and fill with boiling water. With fruits use syrups.

9. With glass jars always use a new rubber. Test the rubber by stretching or turning inside out. Fit on the rubber and put the lid in place. If the container has a screw top do not screw up as hard as possible, but use only the thumb and little finger in tightening it. This makes it possible for steam generated within to escape and prevents breakage. If a glass top jar is used, snap the top bail only, leaving the lower bail loose during sterilization.

10. Place the filled and capped containers on the rack in the sterilizer. If the home-made or commercial hot-water bath outfit is used, enough water should be in the boiler to come at least one inch above the tops of the containers, and the water, in boiling out, should never be allowed to drop to the level of these tops.

11. At the end of the sterilizing period remove the containers from the sterilizer. Fasten covers on tightly at once, turn containers upside down to test for leakage, leave in this position until cold, and then store in cool, dry place. Be sure that no draft is allowed to blow on glass jars as it may cause breakage.

12. If jars are to be stored where there is strong light wrap them in paper, preferably brown, as light will fade the color of products canned in glass jars, and sometimes deteriorate the food value.

Some Canning Facts. The preservation of foods by means of canning is one of the ways in which the problem of food distribution is solved. In countries like the United States and Canada perishable foods cannot be shipped to some districts without serious loss. Even with the present development of cold storage facilities, the canning of foods—vegetables, fruits, fish and meat—is the best solution of getting supplies to large numbers of people at a reasonable cost. Today in the United States more than 350,000,000 cans of food are being annually put up in commercial canneries, and the amount thus preserved in home kitchens represents an estimated total of 175,000,000 quarts.

CANNING, GEORGE (1770-1827), an English statesman who wielded profound influence upon the times in which he lived. He founded a weekly paper to oppose the principles of the Revolution in France; as foreign minister in 1809 during the Napoleonic wars he served his country by vigorous prosecution of the Peninsular War (which see). He was appointed viceroy of India, but remained at home, where his services were more greatly needed. When Greece was fighting for independence he loaned the British fleet to assist the Greeks.

CANNING CLUBS. Of the many activities of the United States Department of Agriculture, none is producing more satisfactory results than the canning-club movement. The work is carried on in connection with school club projects (see **BOYS' AND GIRLS' 4-H CLUBS**), and it has also become a specialized home activity. The latter phase of the movement concerns itself with the organization of "mother-daughter" canning clubs. By means of these home clubs mothers and daughters learn to coöperate with each other in the economic and social life of the household; they work together in reducing living expenses and in making the family diet more attractive. The daughters learn lessons of thrift, economy and industry which are of highest value, and the whole community is benefited by the new spirit of coöperation between different families and groups.

As worked out by the Department of Agriculture, the plan for a mother-daughter home canning club contemplates work covering four years. Canning takes up the greater portion of the first year, and includes not only actual canning of fruits and vegetables, but attendance at demonstrations and study of prepared bulletins and pamphlets. Regular club meetings and an exhibition of work accomplished are other features. The work of the next three years is simply a development and continuation of the first year's activities, with additional instruction in the care and arrangement of the kitchen and in keeping records and accounts. The net result should be a general reorganization of home management along systematic lines.

Club meetings should be held at times most convenient for the majority of members in any community. Many localities find two afternoons a month quite sufficient. The

typical program consists of a business session; a subject-matter program, devoted to reports, discussions of canning methods, etc.; and a special program, which may be quite varied. Current events, school problems, music, games, etc., could all be included to good advantage.

The special division of the Agricultural Department which supervises the canning-club movement is prepared to furnish full instructions as to membership, organization and methods. Letters of inquiry should be addressed to the state agent in charge of boys' and girls' club work, at the state college of agriculture, or to the States Relation Service, North and West, Department of Agriculture, Washington, D. C.



CANNON, a big gun, or piece of ordnance, mounted on wheels and drawn by horses or motor truck, or mounted on specially-built railroad cars. The various types of cannon are the most destructive of all modern weapons of warfare except the machine gun (which see). The present-day term that is employed in referring to cannon is *artillery*; the older word is seldom heard. General information as to the size and power of great guns will be found under the title **ARTILLERY**.

Process of Manufacture. The steel in great guns must resist a pressure of at least twenty tons to every square inch of surface. Manufacture has been brought to this degree of perfection through constant effort, made necessary by competition among nations to produce the most destructive weapons of war. A few years ago hardened steel met all requirements, but to-day were such metal used in the great guns, the pressure would be too great to withstand. Carbon steel is now used, with sometimes a small proportion of nickel added to it.

In the process of manufacture the open hearth method (see **STEEL**) is employed in producing the molten steel. After the molten steel has cooled, it is then reheated and passed to a hydraulic press and forged to the required shape of the gun. Formerly a steam hammer did this forging, but now hydraulic pressure as great as 10,000 tons is used. When forging is complete, the gun

is heated again and annealed, after being allowed to cool by being placed in warm sand. Hardening continues still further by heating the metal to 1,600° F. and immersing it quickly into an oil bath.

The forging is then placed on a lathe and the barrel is bored to the required size. The process above described refers only to the tube of the gun; it must now be fitted to the outside covering, or jacket, which gives it the strength to resist tremendous pressure from inside when the gun is fired. The outer tube is forged about one-tenth inch larger than the circumference of the inner tube, so it will fit over it. The jacket is put in place when heated and on cooling it contracts so closely over the tube as practically to become a part of it. Even after this it is further strengthened by having a number of extra bands shrunk on to it by the same process.

The breech of the cannon is an improved piece of mechanism which must move swiftly and smoothly into its place and yet be strong enough to bear the terrific recoil of the discharge. Various forms of mechanism are in use, but most of the cannon are fitted with what is called the interrupted screw. In the latest modification of this, the breech block is divided into twelve or more longitudinal sections, every fourth one of which is blank, while the others have screw threads and vary in diameter. One-twelfth of a turn of the breech block will engage three-fourths of its surface into the breach.

Historical Development. The precise period at which engines for projecting missiles by mechanical force (see CATAPULT) were supplanted by those utilizing explosive materials is a matter of controversy, the invention of cannon being even attributed to the Chinese, from whom the Saracens may have acquired the knowledge. They were brought into use in France as early as 1338. At first they were made of wood, well secured by iron hoops, the earliest being somewhat conical, with wide muzzles, and the later, cylindrical. They were then made of iron bars firmly bound together with iron hoops like casks. Bronze was used in the second half of the fourteenth century, toward the close of which cast-iron ordnance came into use. A form of breech-loading cannon was introduced in the sixteenth century.

Cannon were formerly dignified with great names. Twelve cast by Louis XII were

called after the twelve peers of France, and Charles V had twelve called after the twelve apostles. Later they were named from the weight of the balls which they carried—6-pounders, 12-pounders; but they are now usually designated by their caliber or diameter of bore. Thus a gun with a bore 6 inches in diameter is called a 6-inch gun; with a bore of 8 inches, an 8-inch gun, etc.

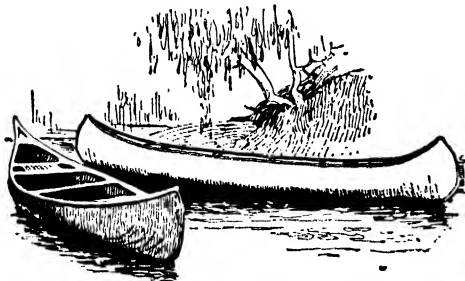
Great improvements and changes in the manufacture of cannon have been introduced in recent times. Not long ago they were all made of iron, brass or gun metal (a variety of bronze), by casting. The introduction of rifled small arms led the way to that of rifled cannon and the adoption of heavy armor for ships of war rendered guns of enormous power and magnitude necessary in order to penetrate their sides. The increased inertia of the projectiles and their rapid rotation in these rifled guns tried the piece so severely that cast iron and bronze were discarded in favor of steel. The World War saw the development of various types of cannon of tremendous range and power. Especially effective were the mortar and the howitzer, which are designed to release their missiles at a steep angle. Both types were used with deadly effect against the supposedly impregnable Belgian forts. See ARTILLERY; HOWITZER; MORTAR.

CANNON, JOSEPH GURNEY (1836–1926), one of the most famous and almost the last of a generation of American legislators whose personality dominated public life in large measure. Cannon was born at Guilford, N. C., but moved to Illinois when a young man, locating at Danville. He was admitted to the bar in the latter state, and was state's attorney for Vermilion County (1861–1868). From 1873 to 1891 and from 1893 to 1913 he served as a Republican in the House of Representatives. During this period in Congress he was for eight years chairman of the appropriations committee; from 1903 to 1911 he was Speaker of the House, being defeated in the latter year for this honor because the House became Democratic, and Champ Clark succeeded him in the Speaker's chair. In 1912 he was defeated for reelection and for the 1913-1915 session of Congress he was a private citizen—the second two-year period of absence from Congress in forty years. In 1914 he was elected again, taking his seat in the first session of the Sixty-fourth Congress in 1915, and was

again honored in 1916 and in 1918. Cannon aspired to be President of the United States, and in the national Republican Convention of 1908 he received Illinois' complimentary vote on the first ballot.

He was widely called "Uncle Joe Cannon," and the nation became familiar with the term, for it followed him throughout most of his public career. He was a friend of Lincoln and in his later years has looked much like the martyred President. He was made chairman of the Lincoln Memorial Commission in 1914.

CANOE, *ka noo'*, and **CANOEING**, *ka noo'ing*. A canoe is a light boat, narrow in the beam and propelled by paddles, sometimes in conjunction with sails. The name was originally given to the boats of uncivilized races, but its application has been considerably extended, and canoes of home make may be seen on the waters of most civilized countries. They are of the most diverse materials and construction. The simplest ones were hollowed out of a single log and were known as *dugouts*. The Indian canoes of Canada are of birch bark and covering a wooden frame. The Eskimo *kaiak* consists of a light wooden frame covered with seal skins sewed together with sinews, and having only one opening to admit the boatman to his seat. In the islands of the Pacific the



CANOES

natives have double canoes, united by a strong platform and serving in this way as one vessel. The ordinary canoe used in recreation weighs from forty to sixty pounds. Typical forms are shown in the accompanying picture. See, also, the article **BOAT**, and illustrations therewith.

Canoeing is a delightful pastime wherever there are lakes, rivers and forests. The boat draws little water and under skilful management can be taken successfully through rapids and can be sent with great

speed over the still water. Every summer many people leave the cities on camping excursions and with their canoes are able to explore many delightful places that otherwise would be entirely inaccessible.

One of the first things to learn in canoeing is the proper way to get in and out of the boat, for the peculiar shape of a canoe makes it easily upset. It is dangerous, for example, to throw a heavy weight suddenly on the side of a canoe, and so it is safest to climb in at the bow or stern. When the canoe is entered at the side the step should be taken in such a way that the feet land directly in the bottom of the canoe, not near the edge. One or two persons may propel the canoe, but if there are two the stern paddle should be on the right side when the bow paddle is on the left. A single paddle may be wielded from either side, but the paddler sits preferably at the stern.

CANONIZATION, *kan un i za'shun*, a Roman Catholic ceremony by which the honor of sainthood is bestowed on certain qualified persons. A candidate to be successful must have performed at least two miracles. The first step is a strict inquiry into the character of the candidate and the authenticity of the miracles accredited to him. Then comes the announcement of beatification; after several years have elapsed, during which the fitness of the candidate has been proven, he is declared a saint and a day is set aside for the celebration of his memory. The power to investigate the life of the prospective saint and to announce his beatification and canonization is vested in the Pope.

CANON, *kan'un*, **LAW**, a term used in the Roman Catholic Church to signify the body of law which regulates Church doctrines and policies. The canon law is made up of epistles and bulls of Popes, decrees of ecclesiastical councils, certain civil law sayings, Bible teachings and utterances of the Church fathers.

CANOVA, *kano'va*, ANTONIO (1757-1822), an Italian artist, one of the most prominent figures of modern times in the field of sculpture. At the Academy of Venice he had a brilliant career, and in 1779 he was sent by the senate of Venice to Rome, where he produced his *Theseus Vanquishing the Minotaur*. In 1783 Canova undertook the execution of the tomb of Pope Clement XIV in the Church of the Apostles, a work inferior to his second and perhaps his best

public monument, the tomb of Pope Clement XIII in Saint Peter's. *Psyche and Butterfly*, *Hebe*, the colossal *Hercules Hurling Lichas into the Sea*, the *Pugilists* and the group of *Cupid and Psyche* are among his more noted works. In 1796 and 1797 Canova finished the model of the celebrated tomb of the Archduchess Christina of Austria and made the colossal model of a statue of the king of Naples. He afterward executed in Rome his *Perseus with the Head of Medusa*, which, when the *Belvedere Apollo* was carried to France, was thought not unworthy of its place and pedestal. In 1802 he was invited by Bonaparte to Paris to make the model of his colossal statue.

CANTA'BRIAN MOUNTAINS, the general name given to the various mountain ranges extending from the western Pyrenees along the north coast of Spain to Cape Finisterre. Their length is slightly over 300 miles, and in elevation they vary from 3,000 to 8,800 feet. The highest peaks are near the center of the range. They present numerous bold promontories and headlands along the coast.

CANTALOUPE, *kan'ta loop*. See MUSK-MELON.

CANTATA, *kan tah'ta*, a class of musical compositions in which a story is told by the singers. The score is divided into choruses, solos, duets, trios and quartets. The cantata is shorter than either oratorio or opera, and when written upon a sacred theme, differs from the former in being less symbolical; when written upon a secular theme, it differs from opera in its lack of scenic accessories. Typical cantatas are Dudley Buck's *The Golden Legend* and *Light of Asia*. *The Rose Maiden* and *Queen Esther* are other melodious and popular cantatas. See ORATORIO; OPERA.

CANTERBURY, *kan'ter ber i*, ENGLAND, a city in Kent, famous as the seat of Canterbury Cathedral and as the religious center of the country. Here, too, are the shrine of Thomas à Becket and the tomb of Edward the Black Prince. Canterbury lies fifty-five miles southeast of London. It dates from the Roman period and has numerous relics and a number of fine schools, including a grammar school founded by Henry VIII. A delightful picture of this interesting old town is given by Charles Dickens in the great novel *David Copperfield*. Population, 1931, 24,450.

CANTERBURY TALES, the masterpiece of Geoffrey Chaucer, the most famous English poet of the fourteenth century. The title refers to the plan of the poem, which was to consist of the stories told by a group of persons while on a pilgrimage to the shrine of Thomas à Becket, at Canterbury. The author planned to have each of the characters relate two tales, but he died before he completed the work. Even in its unfinished state it is an enduring monument of his poetical genius. To-day most readers are familiar only with the *Prologue*, which describes the men and women of the company, with delightful touches of humor and sure insight into human character. In this company of pilgrims is the knight, clothed for battle, "a very perfect, gentle knight," very pious in belief although guilty of many, many sins. The squire is only twenty years old, strong in body, charming in person and faithful to the knight. His tales of heroism prove his right to be made a knight. The yeoman or common soldier is the only other attendant on the knight and wears a green hood, a sword and a dagger; he is a lusty fellow and sings with the best of them. So much for the military.

The religious orders are represented by the monk, the friar, the summoner who calls delinquents to the church courts, the pardoner who sells indulgences, and the parson who truly exemplifies, as well as preaches, the gospel. Among the professional men in the pilgrim company are the lawyer, the purchaser of supplies for a college, the physician, the alchemist, and the Oxford graduate.

Farm folk include the miller, the reeve, or administrator of estates, and the ploughman. The tradesmen too have joined the company: the boastful merchant, the shipman who had sailed on all the seas, the haberdasher, a cook and a good wife from the town of Bath so famous for cloth manufacture.

Through the descriptions of these pilgrims and by means of the tales they tell Chaucer presents a picture of his times for the purpose of showing the immoral manners of the age. He draws his materials from every social rank and is in fact a gifted historian. Moreover he is a whole-souled reformer, hoping to assist in correcting the social and political wrongs of England. He sees that high birth, fortune and worldly glory are not to be compared with truth, virtue, manliness, gentleness and love.

CANTON, *kan ton'*, CHINA, one of the largest cities of the country, and a commercial center of first rank. It is situated in southeastern China, on the east bank of the Pearl River, between seventy and eighty miles from the sea. Canton is the capital of the province of Kwang-tung. It consists of two parts—the ancient walled city, six miles in circumference, and the suburbs, extending along the river on both banks. Thousands of persons also live in house boats on the river. Unlike most Oriental cities, Canton is a fairly clean municipality. An inner wall divides the city proper into two sections, called *old* and *new*. The former has narrow streets and low houses, and there are innumerable shops containing every conceivable form of merchandise. Here, too, are the pagodas, mosques and temples of a typical Chinese city. In the newer part, however, one sees churches, libraries, schools and business houses in Western style of architecture. The foreign mercantile houses and the British, French and American consulates have as their special quarter an area in the suburbs southwest of the city, with water on two sides of it.

The industries of Canton are varied and important, embracing the manufacture of silks, cotton goods, porcelain, glass, paper, sugar, lacquered ware, firecrackers and metal goods. Though the natives were long opposed to the entrance of foreigners, since 1861 the city has been open to outside trade and residence. The greater part of the shipping, amounting to 5,000,000 tons a year, is under the British flag. Population, about 900,000.

CANTON, OHIO, founded in 1805, is the county seat of Stark County, on the Pennsylvania, the Baltimore & Ohio and the Wheeling & Lake Erie railroads, 60 miles southeast of Cleveland and 101 miles northwest of Pittsburgh. The city has an airport; nine bus lines are available. The 230 manufacturing plants employ more than 40,000 persons. The products include sheet metal, fabricated steel, safes and vaults, ice machinery, chemicals, chinaware, rubber products and electric vacuum cleaners. The public auditorium seats 4,400 persons; there are 11 parks and a zoo. Some 25,000 pupils attend school. There are 36 school buildings and 90 churches.

The former home of William McKinley is located one block from the Lincoln Highway. The McKinley National Memorial, the tomb

of the martyred president, has been made into a famous beauty spot.

There are seven country clubs and 14 golf courses. More than 85 fraternal organizations are active, several of which possess imposing temples. More than once Canton has doubled her population in 10 years. Population, 1930, 104,906, a gain of 20.5 per cent in 10 years.

CAN'TONMENT, a camp or district in which soldiers are quartered. The term refers specifically in India to a military town containing barracks, houses for officers, huts for native troops, parade grounds, administration buildings, etc.

In the United States, during the World War, thirty-six cantonments were built in various parts of the country for the training of recruits.

CANUTE, *ka nute'*, (about 994-1035), king of England, Denmark and Norway. He went to England in the second campaign of Sweyn his father. He continued his father's policies after Sweyn died and compelled Edmund Ironside to share with him the rule in England. This he accomplished by devastating the eastern coast and carrying on his ravages in the south of England. Presently Edmund died by assassination and Canute was accepted as king of all England. His brother Harold died leaving to him the kingdom of Denmark in 1018. In England he made tremendous sacrifices so as to gain the confidence of his English subjects. He restored English customs and established equal rights and protection of property for the English. He built churches and took missionaries with him on his trips to Denmark. He made many changes in the government of Denmark such as establishing the royal guard of 3,000 men; from this guard sprang the Danish nobility of later times. By 1030 he had conquered Norway and was accepted as king. The year following he compelled Malcolm of Scotland to acknowledge his supremacy. He appointed his son Hardicanute as his successor in Denmark; another son, Sweyn, he assigned to Norway; and to the third son, Harold, he left England.

CANVAS, a strong, coarse cloth made of cotton or flax, and extensively used for sails, tents and awnings. The canvas used for the sails of large vessels is made of flax and is called sailcloth. A lighter and thinner variety, called duck, and made of linen or cotton, is used for small sails. Duck of finer

quality is a favorite material for men's and women's summer outing costumes. The canvas used by artists for oil paintings is usually of linen.

CANVASBACK, a sea duck living in the inland waters of North America, where it feeds upon the roots of the wild celery. It is a large bird, and, as it is considered the finest of water fowl for the table, it has been hunted almost to extinction. Game laws of recent date are now serving to protect it. The plumage is black, white, chestnut-brown and slate color. As the canvasback has a reddish head, it is often confused with the redhead, a duck that is often substituted for it in the markets.

CANYON, or **CAÑON**, *kan'yun*, a term applied in North America to long and narrow river gorges or deep ravines with precipitous and almost perpendicular sides. Canyons are numerous in the Rocky and Sierra Nevada mountains, and some of them, particularly the canyons of the Yellowstone and Yosemite Valley and the Grand Canyon of the Colorado, are numbered with the world's greatest scenic wonders. See **GRAND CANYON OF THE COLORADO RIVER**; **ROYAL GORGE**; **YELLOWSTONE NATIONAL PARK**.

CAP, a covering for the head. It differs from a hat in having no brim. Caps made of worsted, fur or some other soft material, with or without a visor, are worn by men and in some countries by women. Among the ancient Greeks and Romans, caps were worn as a sign of freedom; hence, the cap became in all nations a symbol of liberty. A cap made of lace and silk or muslin was formerly a fashionable style of head-dress for women, but is now not much worn except by servants.

CAPE ANN, a promontory off the northeast coast of Massachusetts, thirty-one miles northeast of Boston. On this cape are the towns of Gloucester, Rockport and Pigeon Cove. There are valuable stone quarries here. On the south and east coasts there are many attractive summer resorts.

CAPE BARROW, or **POINT BARROW**, the most northerly point of Alaska. Barrow village has 330 people.

CAPE BLANCO, *blahN'ko*, a name given to several capes. 1. A cape off the west coast of Africa, on the Atlantic. 2. The most northerly point of Africa, on the northern coast of Tunis. 3. A cape on the west coast of Morocco. 4. The most westerly

point of Oregon, in the United States, on the Pacific coast. A powerful lighthouse is located here.

CAPE BRETON, *bret'un*, or *brit'un*, a rocky island belonging to the Canadian province of Nova Scotia, from which it is separated by the Strait of Canso. The island has large areas of picturesque forest land, and its coal mines are among the most valuable in all Canada. About 7,000 men are engaged in the fishing industry, for the surrounding waters abound in cod, mackerel, herring and whitefish. Cape Breton island has a population of over 122,000, but nearly all of the foodstuffs for the maintenance of the people are transported from the mainland, as the soil is not adapted to agriculture. The island is 3,120 square miles in area, and is divided into four counties, Cape Breton, Inverness, Richmond and Victoria. The chief towns are Sydney, Dominion, Sydney Mines, North Sydney, Glace Bay and Inverness. Originally a French possession, Cape Breton passed into permanent control of the English in 1763, at the close of the French and Indian wars.

CAPE CHARLES, a cape at the southern extremity of Northampton County, Virginia, at the entrance of Chesapeake Bay. It is twenty-five miles north-northeast of Norfolk. A lighthouse with a flashing white light has been erected on Smith Island, off Cape Charles.

CAPE CLEAR, a promontory 400 feet high at the southern extremity of Clear Island, the most southern point of Ireland, about seven and a half miles southeast of Baltimore, County Cork. Clear Island is about three and a quarter miles long and about a mile broad. It has a lighthouse whose revolving light is 455 feet above the sea.

CAPE COD, a peninsula sixty-five miles long and from one to twenty miles broad, on the south side of Massachusetts Bay, forming Barnstable County in the state of Massachusetts. It is mostly sandy and barren, but some portions are fertile and produce a large yield of cranberries, the cultivation of which is the leading agricultural industry. Other portions are well wooded. Provincetown, on the northern extremity of the peninsula, has an excellent harbor and is one of the most important fishing ports on the Massachusetts coast. See **CAPE COD CANAL**.

CAPE COD CANAL, a waterway constructed across a strip of land uniting Cape Cod and the mainland of Massachusetts. As it was excavated in land nearly at ocean level no locks had to be constructed. From shore to shore the canal is eight miles long, but the channel has a length of thirteen miles, terminating in thirty-foot depths in Buzzard's and Barnstable bays. The depth of the main course of the canal at average low tide is twenty-five feet. The approaches in the bays are from 250 to 300 feet wide at the bottom, but the bottom width of the channel in most parts is 100 feet. This width is increased at certain points where boats pass each other. Electric lighting, a long breakwater with a lighthouse, and modern bridges are features of this fine waterway, the operating cost of which is met by toll payments.

Cape Cod Canal was opened to navigation in 1914, under the ownership of the Boston, Cape Cod & New York Canal Company. The enterprise was financed by August Belmont. In July, 1918, President Wilson by proclamation assumed government control of the canal and directed the railroad administration to operate it. It was announced that water-borne coal destined for New England would be moved through the canal, and that much of the shipping plying in and out of Boston would be routed through it. From its completion the waterway has been of great value to coastwise shipping, because it has eliminated the dangerous trip around Cape Cod by way of Nantucket Sound. The frequency of fogs and the prevalence of shoals in the sound had formerly caused numerous wrecks and the loss of many lives. By taking the inside route ships save seventy miles and are assured of protection from storms and submarine attacks.

In 1928 the canal was purchased by the United States Government for about \$12,000,000. It is now toll-free.

CAPE COLONY. See **CAPE OF GOOD HOPE, PROVINCE OF.**

CAPE COMORIN, the southernmost extremity of the peninsula of India. A short distance from the cape are the remains of the once famous town of Cape Comorin, consisting of a fort, village, church and some ancient temples.

CAPE FEAR, a cape at the southern extremity of North Carolina, extending from Smith Island into the Atlantic Ocean. Navi-

gation is extremely dangerous around this point, and from this fact the name possibly was derived.

CAPE FLATTERY, a cape in the state of Washington, bounded on the northeast by the Strait of Juan de Fuca and on the southwest by the Pacific Ocean. It is the farthest point west in continental United States.

CAPE GIRARDEAU, *ji rahr'doh*, Mo., founded in 1806, and named for the French commander Girardot, who held a military post here in 1765, is a city in Cape Girardeau County. It is on the Mississippi River and the Missouri Pacific and the Frisco Lines of railroad. There is also packet service on the river. The city is one of the educational centers of the state; here are a state normal school, with fine, large stone buildings, and a Roman Catholic college, one of the oldest schools west of the Mississippi River. There are ninety acres in parks. Commission form of government has been adopted. The city is eighth among Missouri's cities in manufactures. Population, 1920, 10,252; in 1930, 16,227.

CAPE HATTERAS, a cape on Hatteras Island, along the coast of North Carolina. It is the projecting point of a long reef of sand, which storms and shoals make dangerous to navigation. A lighthouse over 190 feet high has a light that flashes every ten seconds, and three quarters of a mile south there is another steady white light thirty-five feet above the sea.

CAPE HENLOPEN, a cape on the east coast of Delaware, at the entrance of Delaware Bay. This cape is thirteen miles southwest of Cape May.

CAPE HENRY, a cape on the coast of Virginia, at the entrance of Chesapeake Bay, not far from Cape Charles. There are here a life-saving station and a lighthouse.

CAPE HORN, or **CAPE HOORN**, the southern extremity of an island of the same name, forming the most southerly point of South America. It is a dark, precipitous headland, 500 to 600 feet high, running far into the sea. Navigation round it is dangerous on account of frequent tempests; since completion of the Panama Canal few vessels "round the Horn." The cape was first doubled in 1616 by Schouten, a native of Hoorn, in Holland, whence its name.

CAPE LOOKOUT, a point of land on the east coast of North Carolina, about eighty-five miles southwest of Cape Hatteras.

CAPE MAY, N. J., one of the oldest summer resorts on the Atlantic coast, is the most southeasterly of the cities of the state, in Cape May County, about eighty miles south of Philadelphia. It is at the southern terminus of the Pennsylvania-Reading Seashore Lines; it also has a United States Government airport. Industrially, the principal occupation of the region is fishing, chiefly for oysters. The fine beach has for years attracted thousands of visitors who swell the population during the summer months. Permanent population, 1930, 2,637.

CAPE OF GOOD HOPE, a promontory near the southern extremity of Africa, at the termination of a small peninsula extending south from Table Mountain, which overlooks Cape Town. This peninsula forms the west side of False Bay, and on its inner coast are Simon's Bay and Simon's Town, where there is a British naval station. Bartholomew Dias, a Portuguese, who discovered the cape in 1487, called it Cape of Tempests, but John II of Portugal changed this to its present designation. It was first doubled by Vasco da Gama in 1497.

CAPE OF GOOD HOPE, PROVINCE OF, the chief province of the Union of South Africa, known as CAPE COLONY before 1910. It occupies the southern extremity of Africa and extends northward to the twenty-fifth parallel of south latitude. It is bounded on the north by what was German Southwest Africa, Bechuanaland, Orange Free State and Natal, the Orange River forming the dividing line along part of the northern boundary. The area is estimated at about 277,000 square miles, or a little less than the combined areas of Texas, Massachusetts and New Jersey. Population, 1931, 2,800,000.

In the southern portion of the province and along the coast the surface is mountainous and consists of rugged ranges, which rise in a series of successive elevations and enclose lofty plateaus and plains. These ranges run nearly parallel to the coast and attain their greatest elevation inland. The highest points in the northern portion are in the Drakenberg range, on the border of Natal. Table Mountain, rising directly above Cape Town, has an elevation of 3,550 feet. Compass Mountain, in the Snow Mountains in the south central portion, is the highest point and has an elevation of 8,500 feet. The northwestern region is less mountainous. The eastern coast is very regular, but the southern

and western coasts have indentations which form good harbors. The Orange River, which forms part of the northern boundary, receives a number of small tributaries.

The climate is temperate in the south and semi-tropical in the north. The temperature is quite even and mild. Except along the coast in the southeast district, the rainfall is light, and the entire region is considered remarkably healthful.

The province is rich in minerals. Coal is found and worked in a number of localities. There are also deposits of copper, gold, silver and other metals, but the most important mineral is the diamond, which is found in very large quantities in Griqualand West, near Kimberley. For a number of years the annual yield of these diamond mines has exceeded \$25,000,000 in value (see **DIAMOND**; **KIMBERLEY**).

More than \$500,000,000 (mine value) of diamonds have been taken out in less than fifty years, making it the greatest diamond-producing section of the world.

A lack of rainfall prevents the fullest development of agriculture. All of the region is remarkably well adapted to grazing, and large numbers of cattle, horses, sheep and, especially, Angora goats are raised. Wherever the rainfall will admit, the land is tilled and good crops of wheat, Indian corn and other grains are raised. Vegetables and fruits thrive remarkably well in regions having sufficient rainfall, and grapes are also raised and wine is made. Fruits and vegetables are frequently shipped to European countries. Ostrich farming is no longer a profitable industry, because the world demand for feathers has ceased. Once 700,000 birds were kept for their wealth in feathers.

There are over 4,200 miles of railway connecting the important towns. Cape Town is the southern terminus of the Cape-to-Cairo Railway. Nearly all of the railroads are operated by the government, as are the telegraph lines. The commerce of the province is large. The exports consist of wool and mohair, hides and tallow, a few ostrich feathers, fruits and diamonds, while the imports are nearly all of manufactured products and such food stuffs as are not readily produced in the country. The most of the foreign trade is with the United Kingdom.

The inhabitants consist of English, Dutch and natives, which are divided among the Hottentots, Kaffirs, Basutos and Griquas.

There are also a number of Malays and, mingled with these, quite an extensive mixed race resulting from intermarriages. By far the larger part of the white population is of Dutch and English descent.

Government and History. The province of the Cape of Good Hope is governed, like the other British provinces in South Africa, by an administrator, appointed by the Governor-General for five years. The legislative department consists of a council of fifty-one members, elected for terms of three years. An executive committee of four members, who need not be members of the council, forms a sort of cabinet. All ordinances passed by the council are subject to veto by the Governor-General. At the head of the educational system is the provincial university, which is only an organization for the purpose of conducting examinations and granting diplomas and degrees. There are also a number of colleges. The important cities are Cape Town, Port Elizabeth and Kimberley, each of which is described under its title.

The region was settled by the Dutch in 1652. In 1795 it was occupied by the British, but seven years later they relinquished it to the Dutch, only to take possession of it again in 1806. Thirty years later the Dutch settlers, or Boers, dissatisfied with British rule, emigrated in large numbers to the north and settled what are now Orange River Colony and Transvaal Colony. Between these settlers and the surrounding native tribes the colony was frequently involved in war. In 1902 British supremacy was thoroughly established. In 1910 the colony became an original province of the Union of South Africa.

Related Articles. Consult the following titles for additional information:
 Orange Free State Transvaal
 South Africa, Union of South Africa,
 South African War

CAPER, the unopened flower bud of a low trailing shrub which grows from the crevices of rocks and walls and among rubbish, in the countries bordering on the Mediterranean. The plant was introduced into Great Britain as early as 1596, but has never been grown on a large scale. The buds are pickled in vinegar and used in making sauces for meats. The flower buds of the marsh marigold and nasturtium are frequently pickled and eaten as a substitute for capers.

CAPERCAILZIE, *ka pur kal'ze*, or **COCK OF THE WOOD**, the largest of the European grouse, weighing from nine to twelve pounds. The male has an ashy black neck; head, wings and shoulders brown, speckled with small black dots; a variable green breast, and a black belly with white spots. The tail feathers are black, with small white spots near the extremities. The flesh of the capercaillie is highly esteemed for the table in Scotland and Ireland.

CAPERNAUM, *ka pur'na um*, a town in ancient Palestine, frequently mentioned in the Bible. It was on the northwest shore of Lake Gennesaret, but its exact site is unknown. Because it was so often visited by Jesus it was often called "His own city." Many of His miracles were performed here, but the town remained unrepentant, as indicated by the rebuke given in *Matthew XI, 23*: "And thou, Capernaum, which art exalted unto heaven, shalt be brought down to hell." Peter, Andrew and Matthew had their homes in Capernaum.

CAPE SABLE, the name applied to two capes. 1. The most southerly point of the mainland of Florida. 2. The southern extremity of Cape Sable Island, off the southern coast of Nova Scotia, Canada.

CAPE SAINT VINCENT, the southwest point of Portugal. It is noted for the naval victory gained here by the English, under Sir John Jervis (afterward Earl of Saint Vincent), on February 14, 1797, over the Spanish.

CAPETIAN, *ka pe'shan*, **DYNASTY**, the dynasty which ruled in France from 987 to 1328. It began with Hugh Capet, chosen king by the help of the clergy on the death of the last of the Carolingians, and closed with Charles IV, who died in 1328. Throughout this long period, during which, for the most part, son followed father in regular succession, the royal power greatly increased, and France became more nearly a centralized state. It was during the reign of Philip the Fair, a Capetian king, that the common people, or Third Estate, first sent representatives to the National Assembly. The growth of the royal power is shown by the fact that the custom of crowning the son during the father's lifetime, common with the early kings of this house, was found unnecessary after the twelfth century.

CAPE-TO-CAIRO RAILWAY, one of the most ambitious transportation enterprises.

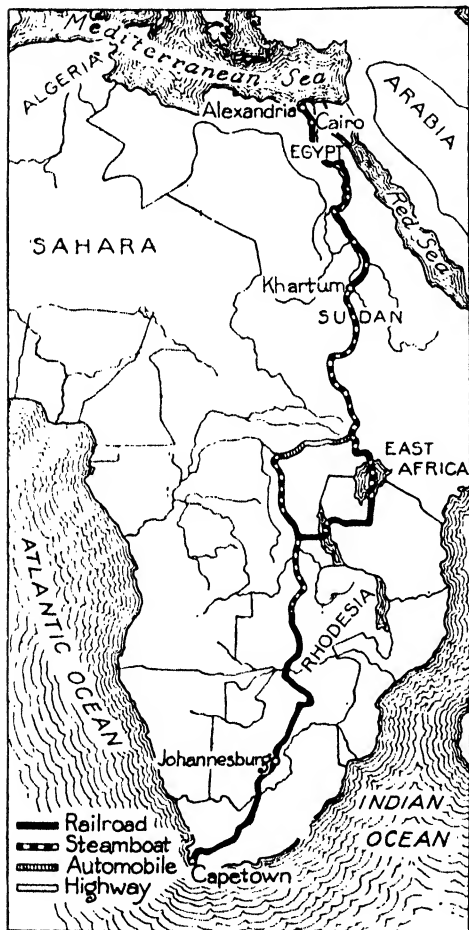
ever undertaken, representing the great dream of Cecil Rhodes—to link the Mediterranean Sea with the Cape of Good Hope by a continuous line of travel through the African continent. This splendid project was begun in 1889. The length of the route is about 5,700 miles, and the trip between the two terminals, Cairo and Cape Town, could be made in from fifty-one to sixty-one days in 1918. This great route is twice the length of the one across Canada between Saint John

Cairo, and to have the two portions meet in Central Africa. This plan was consistently followed. As Kimberley and Cape Town were already connected by rail, construction work on the southern branch began at the former place in 1889, and rapid progress was made until the Zambezi River was reached. To span the river the engineers constructed a cantilever bridge below Victoria Falls; this structure, which is 420 feet above the water and has a span of 500 feet, is the highest bridge in the world. As the workers advanced farther north they encountered all the difficulties peculiar to a land remote from civilization and often infested with disease, and the progress made tells a story of heroism unsurpassed in railroad building.

The northern portion of the road was undertaken under the direction of the Egyptian government, and by 1914 about 1,400 miles of track had been laid. The World War, though it created difficulties in regard to capital and raw material, hastened construction in places where military operations were undertaken against the Germans, and the Belgian line between the Congo River and Lake Tanganyika was rushed to completion in 1915. The line which carries the railway system of British South Africa northward into Belgian Congo was extended 150 miles after the war began, and on May 22, 1918, it reached Bukama, the head of steam navigation on the upper Congo. One may therefore travel by a continuous line of railway north from Cape Town to Bukama, but the trip northward to Cairo from Bukama is as yet a succession of rail, steamship, automobile and highway journeys. In course of time rail construction will supplant other modes of travel on the northern branch, but nevertheless a reasonably easy journey from the Mediterranean to the Cape of Good Hope is now an accomplished fact.

The possibilities of the Cape-to-Cairo road are not difficult to foresee, as the success of this enterprise means greater progress in colonization and development of Africa's vast resources. Many branch lines running east and west connect with this great backbone of the continent, and others are in process of completion. See RHODES, CECIL: AFRICA.

CAPE TOWN, SOUTH AFRICA, the capital of the province of the Cape of Good Hope and the legislative capital of the Union of



and Vancouver, and about one-fourth greater than the line between Moscow and Vladivostok. The Cape-to-Cairo Railway is, moreover, the only continental line which extends from north to south.

It was planned to build the road northward from Cape Town and southward from

South Africa, situated thirty miles north of the Cape of Good Hope. The city has a beautiful location on the slopes of Table Mountain, and contains numerous parks and many fine buildings, among which are the Houses of Parliament, the Supreme Court, the South African Museum, the cathedral, a number of churches and mosques and a synagogue. There are also numerous educational institutions, including colleges and an examining university, besides the Cape Observatory. The harbor is protected by a breakwater over 4,000 feet long, and the docks cover an area of sixteen acres.

Cape Town is a port of call for nearly all vessels passing around the Cape of Good Hope, and in commercial importance it is surpassed in rank only by Port Elizabeth. Its trade is with nearly all ports on the Atlantic and Indian oceans. It is connected by railway with all the important towns of the province and surrounding provinces and is the southern terminus of the Cape-to-Cairo Railway. Population, 1931, including suburbs, 146,249 (white), 130,000 (colored).

CAPE VERDE, *vurd*, the extreme west point of Africa, between the Senegal and the Gambia, discovered by Fernandez in 1445. The appearance of a group of baobab trees, with their green tops showing on the white coast, is said to have suggested the name.

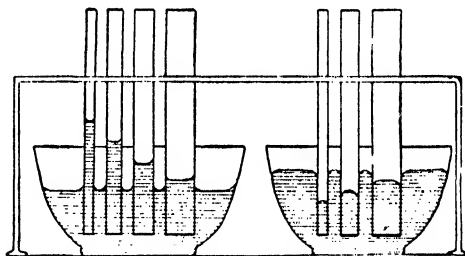
CAPE VERDE ISLANDS, a group of volcanic islands and rocks in the Atlantic Ocean west of Africa, belonging to Portugal. Their area is 1,480 square miles. They produce rice, maize, coffee, tobacco, sugar cane, nuts and various fruits. Most of the inhabitants are negroes or of mixed race. The chief town is Praya, a seaport on Santiago, the largest island. Porto Grande, on São Vicente, is a coaling station for steamers and has the best harbor in the group. The islands are named for Cape Verde, on the coast of Africa nearest to them. Population, 150,000.

CAPE WRATH, the northwest extremity of Scotland, in Sutherlandshire. It is a pyramid of gneiss bearing a lighthouse, the light of which is 400 feet above sea level. The cape is noted for its aspect of grandeur.

CAPIAS, *ka'pi as*, a Latin word meaning *you may take*, is the name given in law to a common-law writ requiring an officer to arrest a person and hold him in custody. The *capias* is rarely issued, having been superseded by other statutory writs. See **ARREST**.

CAPILLARIES, *kap'i la riz*, in anatomy, the fine blood vessels which connect the arteries with the veins. Some of the capillaries are so small that only one blood corpuscle at a time can pass through. They are largest in the marrow of the bones and smallest in the brain, and in certain organs they divide and subdivide, forming a network. The capillary walls are thin and composed of but one layer of tissue; through them the blood receives waste products and gives up nutritious material. The blood in the capillaries of the lungs receives oxygen and gives up carbonic acid. See **BLOOD**; **CIRCULATION**.

CAPILLARITY, the tendency of liquids in small tubes and porous bodies to rise above the level of the liquid in a vessel surrounding the smaller tube. Capillarity can be shown by placing small glass tubes or straws in a vessel of water colored with a little ink. If the tubes are of different size they will show that the liquid rises highest in the smallest tube (see Illustration). By innumerable tests in this manner was proved the principle



CAPILLARITY

that the smaller the tube the stronger the capillarity. Capillarity is due to the adhesion of the liquid to the walls of the tube or the vessel, and a close examination will show that the surface of a liquid in a vessel is concave, the portion touching the walls of the vessel being raised above that in the center. When mercury is confined in a glass vessel, the principle of capillarity is reversed, as there is no adhesion, and the surface of the mercury is convex.

The part which capillarity plays among natural phenomena is a very varied one. By it the fluids circulate in the porous tissues of animal bodies, the sap rises in plants and moisture is absorbed from air and soil by the foliage and roots. For the same reason a sponge or lump of sugar, or a piece of blotting paper, soaks in moisture, and the oil rises in the wick of a lamp.

CAPITAL, in business, is the entire group of articles and materials from which the owner hopes to derive an income. The list includes money, land, buildings, machinery, tools and raw materials necessary to the conduct of an enterprise. It is commonly divided into two main classes—circulating capital and fixed capital. *Circulating capital* comprises those forms of capital which require renewal after every use in production, being consumed (absorbed or transformed) in a single use; for instance, raw materials. *Fixed capital*, on the other hand, comprises every form of capital which is capable of use in a series of similar productive acts; for example, machinery and tools. From the ordinary economic point of view, capital is conveniently limited to material objects directly employed in the reproduction of material wealth, but from the higher social point of view many things less immediately concerned in productive work may be regarded as capital. Thus, Adam Smith includes in the fixed capital of a country "the acquired and useful abilities of all the inhabitants"; thus, technical knowledge, acquired ability in any line, even muscular strength, Smith would class as capital, and assume these to rate next as capital elements to investments in buildings and machinery.

The return which capital yields in production is termed *interest*, to distinguish it from *rent*, which is the return for the use of land, and *wages*, or the return to labor.

During recent years capital has shown a marked tendency to concentration; or, more accurately, the *management* of capital has tended to pass into few hands. This has served to draw more sharply the distinction between the capitalist and laboring classes and to increase their feeling of antagonism. Although most economists declare the interests of both sides to be ultimately identical, the crushing out of small owners and the fear of the absolute power to fix both price of labor and of product which may, by absence of competition, come into the hands of the great owners, have created a strong opposition to the centralizing of capital. It has the advantage, however, of making possible a lowered cost of production and of preventing wasteful competition. Various schemes for the public ownership and direction of capital are the inevitable outgrowth of the condition of dissatisfaction. See **SOCIALISM**; **TRUSTS**; **TRADES UNIONS**.

CAPITAL, an architectural term, usually restricted to the upper portion of a column, the part resting immediately on the shaft and separating it from the entablature, or other portion of the structure above the pillar. In classic architecture, each order has a peculiar form of capital, which is, more than anything else, its distinguishing characteristic.

Belonging to the three orders of Grecian architecture, respectively, are the *Doric*, the *Ionic* and the *Corinthian* capitals, of which the first was later modified by the Romans in their *Tuscan* columns, and the last two combined in the *Composite* order. (The classic orders are fully explained and illustrated in the article **COLUMN**.) From these developed the various Gothic capitals.

CAPITAL LETTERS, the large letters used in writing and printing. They are used most commonly as the initial letters of certain words, or of all words in certain positions. During the Middle Ages, as well as in ancient times, there was no distinction between different kinds of letters, but the custom of illuminating the first letter of a book or of a chapter gradually gave rise to a more general use of large letters. In almost all countries, sentences and proper names begin with capital letters. In German every noun begins with a capital, and this was formerly the rule in English. Adjectives which are derived from proper names are in English begun with capitals, as *French*, and *Canadian*. [See headings of each letter in these volumes.]

CAPITAL PUNISHMENT, a term derived from the Latin *caput*, meaning *head*, refers to the penalty of death imposed by a court upon a man or woman found guilty of wilful murder or treason. The methods employed in the United States are hanging, electrocution or shooting.

Capital punishment prevails in all the States except Kansas, Maine, Michigan, Minnesota, North Dakota, Rhode Island, South Dakota, Wisconsin, and Wyoming. Hanging is the usual method employed, but death by electrocution (which see) has been adopted in Arkansas, Florida, Georgia, Illinois, Indiana, Kentucky, Massachusetts, Nebraska, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Vermont, and Virginia. In Utah a condemned man may choose hanging or shooting; lethal gas in Nevada, Arizona, North Carolina, and Colorado.

In Europe, hanging is resorted to in Great Britain, Austria and Russia; in Germany criminals are beheaded or shot; in France the guillotine is being rapidly supplanted by hanging; in Spain the garrotte (which see) is occasionally used, but the condemned is usually sentenced to penal servitude in chains. Other countries on the continent have abolished the death penalty. Japan hangs its criminals within prison walls.

CAPITALS OF THE UNITED STATES.

Since the adoption of the Declaration of Independence, nine different cities other than Washington have been for longer or shorter periods the seat of government of the United States. The famous Continental Congress which adopted the Declaration sat in Philadelphia from September 5, 1774, to December, 1776, but during the Revolution, in order to avoid the British, it was necessary to make frequent changes in regard to the meeting place of Congress. The list covering the period from December, 1776, to June, 1790, is as follows:

- Baltimore, Dec. 20, 1776, to Mar., 1777.
- Philadelphia, Mar. 4, 1777, to Sept., 1777.
- Lancaster, Pa., Sept. 27, 1777, to Sept. 30, 1777.
- York, Pa., Sept. 30, 1777, to July, 1778.
- Philadelphia, July 2, 1778, to June 30, 1783.
- Princeton, N. J., June 30, 1783, to Nov. 20, 1783.
- Annapolis, Md., Nov. 26, 1783, to Nov. 30, 1784.
- Trenton, N. J., Nov. 30, 1784, to Jan., 1785.
- New York, Jan. 11, 1785, to June, 1790.

Philadelphia was the temporary capital until 1800, but the Constitution, drafted in 1787, had made provisions for the selection of a Federal district and national capital. President Washington chose a site on the Potomac (see DISTRICT OF COLUMBIA), and in 1800 the city of Washington became the permanent seat of government.

CAPITOL, in Roman history the name of the smallest of the seven hills of Rome, called also the Capitoline Mount. The hill had two summits, a northern and a southern; on the latter stood the great temple to Jupiter, while the former was the site of the citadel of Rome. The temple to Jupiter, in which the state religion had its center, was itself sometimes called the Capitol. Other edifices on the hill included the temple of Jupiter Tonans (thundering) and the Tabularium, in which were kept the public records.

The word *capitol* is applied to-day to a

building which houses the government offices of a state, province or country. It is located in the seat of government, or *capital* city.

CAPPADOCIA, *kappa doh'she ah*, in antiquity, one of the most important provinces in Asia Minor, the greater part of which is included in the modern province of Karaman. Its boundaries varied greatly at different times. It was conquered by Cyrus and was ruled by independent kings from the time of Alexander the Great until A. D. 17 when it became a Roman province.

CAPRICORNUS, *kap ri kaw'r'nus* (the goat), a constellation of the southern hemisphere and the tenth sign of the zodiac, marking the winter solstice, about December 21, Capricornus was represented by (♑), the horns of a goat, and in art as a figure having the fore part like a goat and the hind part resembling a fish. Capricornus is the name given to the southern tropic. See TROPICS.

CAPRIVI, *ka pr'e've*, GEORG LEO, Count von (1831-1899), second Chancellor of the German Empire. He entered the Prussian army in 1849, served in the war of 1866 and the Franco-German War and was advanced rapidly in rank. In 1882 he was given command of the third army division, and from 1883 to 1888 he was at the head of the admiralty, in which position he reorganized the navy. He held command of the tenth army corps, stationed in Hanover. In 1890 Caprivi became Bismarck's successor as Chancellor, and proved himself a man of great ability.

CAPSICUM, *kap'si kum*, a genus of annual, shrubby plants, with a wheel-shaped corolla, projecting and converging stamens and a many-seeded berry. They are chiefly natives of the East and West Indies, China, Brazil and Egypt, but they have spread to various other tropical or subtropical countries, being cultivated for their fruit, which at times reaches the size of an orange, is fleshy and variously colored and very sharp to the taste.

The fruit or pod is used for pickles and sauces, and also is valuable medicinally. Dried or powdered, the pods are used in making a gargle for sore throat, and they are also employed in the treatment of neuralgia and rheumatism. Cayenne pepper and chili, the favorite condiment of the Mexicans, is prepared from a species of capsicum.

CAP'SULE, a medical term used with two meanings. It refers to a thin membrane

which covers certain parts of the body, as the kidney and lens of the eye, and it is also used to designate a small cylindrical



CAPSICUM

envelope which forms a casing for pills or powders that are unpleasant to the taste.

CAPUA, *kah'pu a*, ITALY, a fortified city in the province of Caserta, situated on a plain eighteen miles north of Naples, on the Volturno. It is the residence of an archbishop and has a cathedral. Population, about 14,000. The ancient city, which figures prominently in Roman history, was situated three and one-half miles southeast of the modern town. Its site is now occupied by the city Santa Maria di Capua Vetere. The ancient Capua was of such extent as to be compared to Rome and Carthage. It was a favorite place of resort of the Romans, on account of its agreeable situation and its healthful climate and many existing ruins, including an amphitheater, attest its ancient splendor.

CAPUCHINS, *kap'uchinz*, or *kapu sheenz'*, monks of the Order of Saint Francis, so called from the capouch, or hood, which is the distinguishing badge of the Order. They are clothed in brown or gray, go barefooted and never shave their beards. Ac-

cording to the laws of the Order the monks must live by begging and may use no gold, silver or silk about their altars. The members are most numerous in Austria. There are Capuchin monasteries in the dioceses of Milwaukee and Green Bay, Wis., New York City and Leavenworth, Kan.

CAPYBARA, *kah pe bah'ra*, a species of rodent, sometimes known by the name of the water hog. It attains the length of about three feet, and has a very large and thick head, a thick body, covered with short, coarse, brown hair, and short legs, with



THE CAPYBARA

long feet. It has no tail. The capybara is common in several parts of South America, and particularly in Brazil. It feeds on vegetables. In the water the animal is perfectly at home. Its flesh is edible.

CARABAO, *kah rah bah'o*, a variety of Asiatic water buffalo, found in the Philippine Islands. Like others of the group, it is characterized by a fondness for ponds, bogs and marshes. Though it is very slow-moving, and refuses to work when the day becomes very hot, the carabao is greatly valued as a beast of burden in its native land, and before the modernization of Manila it was a familiar sight in the business streets of that city. The animal is of a slaty bluish-black color. Among its peculiarities is an extreme dislike for white people.

CARACAL, *kar'a kal*, a species of lynx, native of Northern Africa and Southwestern Asia. It is about the size of a fox and is usually of a deep-brown color, having tufts of long black hair which terminate the ears. It possesses great strength and fierceness.

CARACALLA, *kar a kal'la* (188-217), emperor of Rome from 211 to 217, the son and successor of Septimus Severus. *Caracalla* was a nickname applied to the youth by his father, with reference to the hooded Gallic tunic he was fond of wearing. After he came to the throne Caracalla ordered the

massacre of thousands of his enemies, and following a brief reign of six years he was murdered in Mesopotamia. His name is associated, however, with some of the most celebrated baths of Rome (see below) and with the granting of citizenship to all free inhabitants of the Roman Empire.

Baths of Caracalla. These were built in A. D. 212. They consisted of a group of buildings, the central one of which contained large halls surrounded by gardens, the whole covering 129,600 square yards. The thick walls were covered with marble and the floors were mosaic. The buildings were lavishly adorned with statuary and



BATHS OF CARACALLA

other works of art many of which have been preserved. Water was supplied by the Marcian Aqueduct, and accommodations were made for 16,000 guests.

CARACAS, *kah rah'kals*, VENEZUELA, the largest city and the capital of the republic, is situated in a fine valley about 3,000 feet above the Caribbean Sea. It is connected by railway with the port La Guayra, which is about six miles distant. It has some good buildings, including a cathedral, a university, the federal palace and other government buildings. Caracas has various parks and gardens, electricity, gas and water supply, telephones and tramways. The export trade is in cacao, coffee and tobacco. In 1812 the city was in great part destroyed by an earthquake, and nearly 12,000 persons were buried in the ruins. Population, 1935, 135,250.

CARAMEL, the brown mass which is produced when cane sugar is heated. It is used in cooking as a coloring and flavoring ingredient and in giving a brown color to spirits and other liquids. The name is also applied to a certain preparation of candy.

CAR'AT, a weight of 3.17 troy grains, used by jewelers in weighing precious stones

and pearls. It is divided into 4 *carat grains*, which, in turn, are divided into 2, 4, 8 or 16 parts for more accurate measurements. The term is also used to express the proportionate fineness of gold, a carat being $\frac{1}{24}$ of unit weight of metal. So, if $18\frac{1}{2}$ of an alloy is pure gold, it is said to be "18 carats fine," and when it is "24 carats fine" it is pure, or "solid gold."

CARAVAGGIO, *kah ra vah'jo*, MICHEL-ANGELO MERISI DA (1569-1609), a celebrated Italian painter, born in Caravaggio. In his youth he prepared plaster for the artists, and while engaged in this work he acquired the desire to become a painter. He studied at Milan and Venice, where he was influenced by the works of Giorgione, and later went to Rome, where he found a patron in Cardinal del Monte. The turbulent disposition of Caravaggio involved him in frequent quarrels, in one of which he killed a companion at Rome. He was forced to flee and went to Naples and Malta. Caravaggio was the head of the naturalists and exerted a marked influence on the development of modern art. His paintings, though sometimes coarse, display grandeur and power. His most celebrated works are *Entombment of Christ*, *Saint Sebastian* and *Supper at Emmaus*.

CAR'AVAN, a Persian word used to denote the large companies which travel together across the Asian or African deserts, for the sake of security from robbers. Most numerous of these caravans are the associations of merchants; but caravans of pilgrims, going from Cairo or Damascus to Mecca, cross the deserts every year. Camels are used as a means of conveyance on account of their remarkable powers of endurance. See CAMEL.

CAR'AVEL, the name once applied to various forms of small vessels, particularly to a small ship used by the Spaniards and Portuguese in the fifteenth and sixteenth centuries for long voyages. The ships in which the first expedition of Columbus sailed were caravels. They were narrow at the poop, wide at the bow and carried a double tower at the stern and a single one at the bow. There were four masts and a bowsprit, and the principal sails were lateen sails. Exact reproductions of the three ships of Columbus were exhibited at the World's Fair held at Chicago in 1893, and afterwards were placed in Jackson Park, in that city, where they remained for several years.

CARAWAY, a common biennial plant, with a tapering fleshy root, a furrowed stem and white or pinkish flowers. It produces a well-known seed used by confectioners and bakers and in medicine. Caraway seeds are characterized by a spicy fragrance and an aromatic taste.

CARBICE. See CARBONIC-ACID GAS; ICE.

CARBOHYDRATE, *kar bo hy'drate*, the name of a class of substances forming an important element in the daily food of the average person. Carbohydrates are chemical compounds of carbon, oxygen and hydrogen. Important examples are sugar of various kinds, starch and cellulose (which see). Vegetable foods are especially rich in carbohydrates; starch is an important ingredient of wheat, oats, corn and the other grains, and of potatoes, and special sugars constitute a distinctive element in the composition of honey and fruits. In milk is found a carbohydrate called *lactose*. Carbohydrates and fats are the fuel-making and fat-producing elements, while proteins serve to build muscle. A diet consisting of all of these food substances is essential to the welfare of the body. See PROTEIN.

CARBOLIC, *kar bol'ik*, **ACID, PHENIC**, *fé'nik*, **ACID**, or **PHENOL**, *fé'noł*, an acid obtained from coal tar. When pure it occurs in the form of colorless crystals, but on exposure to the light the crystals turn red. It is generally marketed in the form of a colorless, oily liquid, which has a burning taste and the odor of creosote. Carbolic acid is a powerful disinfectant, and is used in large quantities in hospitals for cleansing purposes. It is a deadly poison and can be safely taken internally only when greatly diluted. It causes painful burns when applied to the skin. For directions regarding remedies for poisoning from the acid, see ANTIDOTE.

CARBON, one of the elements, existing uncombined in three forms, as charcoal, as graphite, or plumbago, and as diamond. The diamond is the purest form of carbon; in the different varieties of charcoal, in soft coal and in anthracite, it is more or less mixed with other substances. Pure charcoal is a black, brittle, light and inodorous substance. It is usually the remains of some vegetable body, from which all the volatile matter has been expelled by heat; but it may be obtained from most organic matters, animal as well as vegetable, by ignition in closed vessels.

The compounds of this element are more numerous than those of all the other elements taken together. With hydrogen, especially, it forms a very large number of compounds, called hydrocarbons, which are possessed of the most diverse properties, chemical and physical. With oxygen, on the other hand, it forms only two compounds, carbonic oxide and carbonic-acid gas (which see). See DIAMOND; CHARCOAL; GRAPHITE; COKE.

CARBONATES, *kar'bon ates*, compounds formed by the union of carbonic acid with a base. Carbonates are an important class of salts, many of them being extensively used in the arts and in medicine. They include carbonate of soda, or sal soda, a much-used washing powder; bicarbonate of soda, used in cooking; carbonate of copper, from which copper is extracted; and carbonate of iron, or siderite. See BIOCHEMISTRY.

CAR'BONDALE, P.A., founded in 1861 and named for the great deposits of coal in the vicinity, is a city in Lackawanna County, on the Lackawanna River, sixteen miles northeast of Scranton. Anthracite coal mining is the basis of the city's industrial life, but there are railroad shops and manufactures of underwear, silk, and beer. There are two hospitals. Transportation is provided by the Erie, the Delaware & Hudson and the New York, Ontario & Western railroads. Five miles distant, at Fairview, is the state criminal insane asylum. From the city's location in the mountains a view of the distant Catskills may be had on clear days. The city is governed on the mayor and council plan, succeeding the commission form. Population, 1930, 20,061.

CARBON DISULPHIDE, *di sul'fide*, or **CARBON BISULPHIDE**, a compound of carbon and sulphur, which is known as a thick, colorless liquid. When pure, it has rather a pleasant odor, but ordinarily, owing to the presence of impurities, it has a very disagreeable smell. It evaporates rapidly, and by passing a current of air over it very low temperature may be obtained in its use. It is a strong solvent for such substances as India rubber, gutta-percha, the resins and phosphorus. Carbon disulphide is used in the manufacture of artificial silk from wood pulp, and occasionally to kill rats, mice, insects and other animal pests. It is manufactured by heating together carbon and sulphur.

CARBONIC-ACID GAS, or **CARBON DIOXIDE**, a gaseous compound of carbon and oxygen, colorless, without smell, twenty-two times as heavy as hydrogen, and existing in the atmosphere to the extent of three volumes in 10,000. It is poisonous to animals. This is probably due to the fact that animals cannot separate the oxygen of the compound from the carbon, and consequently suffer from a lack of free oxygen when they inhale the carbon dioxide.

Carbonic-acid gas is set free from fermenting liquors and from decomposing vegetable and animal substances, and is largely evolved from fissures in the earth, constituting the *choke damp* of mines. Its solution in water has a pleasant, sour, biting taste, and aerated beverages of all kinds—beer, champagne and carbonated mineral waters—owe their refreshing qualities to its presence, for though poisonous when taken into the lungs, it is agreeable when taken into the stomach. *Soda water* is water charged with carbon dioxide. Since it does not support combustion, it is used as a fire extinguisher when put up in iron cans under pressure. This gas is formed and given out during the breathing of animals, and in burning from the oxidation of carbon in the fuel. It exists in large quantities in all limestones and marbles. Plants absorb carbonic-acid gas from the air and transform it by the aid of light into plant tissue. From its weight it has a tendency to subside into low places, vaults and wells, rendering some low-lying places and many caves uninhabitable.

Liquid and Solid Carbon Dioxide. Carbon dioxide, when subjected to a pressure of about 450 pounds to the square inch and a temperature of 5° F. below zero, is easily changed to a liquid. The gas is forced into steel cylinders by means of a powerful pump. By a series of operations this liquid is cooled still further, then allowed suddenly to expand into a snow-like mass of solid carbon dioxide. This product is known as "dry ice" or "carbice" and is used commercially as a refrigerant, especially in the transportation of perishable foods. Solid carbon dioxide has a temperature of about 114.5 degrees, Fahrenheit, below zero.

CARBONIC OXIDE, *kahr bon'ik ox'ide*, or **CARBON MON'OXIDE**, a gaseous compound of carbon and oxygen, obtained by passing carbonic acid over red-hot fragments of charcoal, contained in a tube of iron or

porcelain, and in the exhaust from automobile motors. It is a colorless, inodorous gas, having neither acid nor alkaline properties and is very poisonous.

CARBONIFEROUS PERIOD, the last division of the Paleozoic Era, named from the formation of the coal measures which took place at this time. East of the Rocky Mountains North America was probably all above the sea, though during the early part of the period what forms the great bituminous coal bed of the Mississippi basin may have been the bottom of a shallow lake. In all continents marshes and swamps became choked with a rich growth of vegetation, and during the period there were numerous elevations and subsidences of the land, as shown by the large number of veins found in the coal measures.

The vegetation included rushes, club mosses, ferns and lepidodendrons, which are now extinct, all of which grew to a great size. Ferns often formed trees having trunks more than twenty feet in height, and club mosses attained a height of seventy-five or one hundred feet. It was from these plants that most of the coal was formed, and their universal distribution, as they are found in all coal measures, shows that the conditions of climate and moisture were uniform throughout the earth. The animal life of the period included insects, scorpions, amphibians, crinoids, mollusks and fishes. See COAL; PALEOZOIC ERA; GEOLOGY.

CARBONIFEROUS SYSTEM, in geology, the great system of rocks which lie between the Devonian system below and the Permian system above. The rocks take their name from the quantities of coal, shale and other carbonaceous matter contained in them. They include the coal measures, millstone grit and mountain limestone, the first being uppermost and containing the chief coal fields that are worked. Iron ore, limestone, clay and building stone are also yielded abundantly by the carboniferous strata, which are found in many parts of the world, often covering large areas. See CARBONIFEROUS PERIOD; COAL; GEOLOGY.

CARBON MON'OXIDE. See CARBONIC OXIDE.

CARBORUNDUM, *kahr bo run'dum*, a polishing substance made by mixing in proper proportions coke, sand, sawdust and a small quantity of salt, and smelting the mixture in an electric furnace specially

constructed for the purpose. The heat required is more intense than that necessary for any other known process, and the time for converting the mixture into carborundum is about thirty-six hours. Carborundum is so hard that it can be used in the place of corundum and emery as an abrasive, and also for glazing brick and for the lining of furnaces that are subjected to great heat. It is made extensively at Niagara Falls. See ABRASIVES; CORUNDUM; EMERY.

CARBUNCLE, *kahr'bung k'l*, a name applied to any one of the scarlet and crimson varieties of garnet, when the stone is cut with a convex face. By the ancients the carbuncle was valued because of its supposed power of shining brightly in the dark. There is a legend that Noah used carbuncles and other stones to illuminate the ark. See GARNET.

CARBURETOR, a device on an internal-combustion engine which receives fuel in the form of gasoline, kerosene or alcohol and transforms it completely into gas, so it will burn instantly without smoke, or carbon. Not only does it vaporize the fuel, but it mixes it with the proportion of air necessary for complete combustion. It must be so constructed that the flow of air and gas through it may instantly vary in accordance with speed demands for an increase or decrease of fuel.

How Carburetion is Effected. The process of mixing air and fuel and completely vaporizing the mixture is called *carburetion*. The fuel enters the carburetor by a feed pipe from a large fuel tank. The quantity admitted is regulated by a float; when the fuel chamber is sufficiently full the float rises and closes a valve in the feed pipe. A passage leads from the float chamber to a jet nozzle, which sprays the fuel into a chamber where mixing with air occurs; action of the piston in the engine draws the fuel into the mixing chamber. When the engine is not running the starter or hand crank must "turn the engine over" to start this suction.

The only outlet from the carburetor is to the cylinders of the engine. The thoroughly-mixed gas enters the cylinders and there encounters electric sparks from spark plugs, which explode it.

The subsequent processes by which the power thus produced is transmitted and made to do work is told in the article Gas Engine.

CARDAMOM, *kahr'da mum*, the dried fruits and seeds of different species of plants called cardamoms. They have a sharp, aro-



CARDAMOM

a, cross section of fruit; b, fruit; c, flower; d, seeds.

matic taste, and are used to make curries, sauces and cordials, as well as for the relief of colic. Those recognized in America as *true* or *official cardamoms* and known in commerce as *Malabar cardamoms*, are the produce of a plant of the mountains of Malabar, in British India, from which country they are imported.

CARDBOARD, a stiff, hard material used extensively in making boxes, calling cards, etc. A piece of cardboard consists of several layers of paper pasted together. A grade known as *bristol board*, made entirely of white paper, is used by artists, but ordinary cardboard consists of a core of one or more sheets of coarse cartridge paper, and an outside covering of fine white paper. Bookbinders use a coarse brown cardboard as the

basis of book covers. This is called *mill-board*. Calling cards are pieces of fine card-board which have been brushed with a mixture of white lead and size.

CAR'DIFF, WALES, the chief port of the country, situated at the mouth of the Taff River, 170 miles west of London. It is the capital of County Glamorgan and the most important commercial center of Wales. The place has a thriving coal and iron trade and contains shipyards, iron plants and manufacturing of tin and steel. The docks are extensive and at high tide can be reached by the largest vessels. The important buildings are the Castle, erected in the eleventh century; the Church of Saint John, built in the thirteenth century, a public library and a university college. Population, 1931, 223,648.

CARDINAL, a dignitary of the Roman Catholic Church, next in rank to the Pope. The cardinals are members of the Sacred College, and are appointed by the Pope; they help him in the management of the affairs of the Church, and on his death they elect one of their members as his successor. The number in the Sacred College may vary, though it was fixed at seventy by Sixtus V in 1586. There are but few English-speaking cardinals; the greater number are Italians. The first cardinal of the United States was McCloskey, appointed in 1875. The four American cardinals now living are William Cardinal O'Connell, Boston; Dennis Cardinal Dougherty, Philadelphia; George Cardinal Mundelein, Chicago; and Patrick Cardinal Hayes, New York. America's most famous cardinal was Gibbons (1834-1921).

The insignia of a cardinal are the cardinal's red hat, given by the Pope, but not worn; the *biretta*, or red cap; the sapphire ring; the purple cassock; the miter of white silk.

CARDINAL BIRD, or **REDBIRD**, a showy North American finch, with fine red plumage and a crested head. A black patch is conspicuous on each side of the bill. The cardinal whistles beautifully, and his clear, ringing note is a great favorite, especially in the Southern states, where the bird is often kept in captivity.

The birds are found in Southeastern Canada and in Eastern United States from New York to Florida. They are permanent residents of certain districts south of the Ohio River, and have been charmingly written about by James Lane Allen in his *Kentucky*

Cardinal. They are easily tamed, and in city parks often learn to come to the call of people, who feed them with nuts.

CARDOZO, BENJAMIN NATHAN (1870-), an Associate Justice of the Supreme Court of the United States, appointed by President Hoover (1932) to succeed Justice Oliver Wendell Holmes, resigned. He is of Jewish descent, was born in New York City and educated at Columbia University. He became a member of the bar in 1891, in 1914 was named a justice of the state supreme court, where he served fourteen years, then was appointed to a vacancy in the state court of appeals; in 1917 he was elected to that court for a full term. Justice Cardozo became known as one of the so-called liberal members of the Supreme Court.

CARDS, PLAYING, pasteboard cards, bearing printed symbols and used for the purpose of playing games of chance and skill. They are of ancient origin, being used probably by the Egyptians, the ancient Jews and the peoples of the Orient before the Christian Era. It is supposed that cards were introduced into Europe by the Crusaders or by the Moors. The set of cards commonly used in Europe and America is known as a *pack* or a *deck* and consists of fifty-two cards, in four *suits* or classes, known as *clubs*, *spades*, *diamonds* and *hearts*, distinguished by the shape of the *spots*, or *pips*, upon their faces, and by colors. Each suit contains thirteen cards, the first ten distinguished by the number of spots or pips; the last three, known as *face cards* and called *Jack* or *Knave*, *Queen* and *King*, respectively, bear fantastic representations of human characters corresponding to these titles.

Related Articles. Cards are used according to many sets of rules, for which see articles upon the common games, including:

Casino	Euchre
Cribbage	Solitaire
Draw Poker	Whist

CAREY, HENRY (1696-1743), a British composer, dramatist and poet. He wrote the words and music of many popular songs, including *Sally in Our Alley* and *God Save the King*.

CARIBBEAN, *kair i be'an*, **SEA**, that portion of the North Atlantic Ocean lying between the coasts of Central and South America and the West India Islands. It communicates with the Gulf of Mexico by

the Yucatan Channel. All ships emerging from or entering the Panama Canal at the Atlantic end must pass through the Caribbean. The chief arms are the gulfs of Honduras, Darien and Venezuela. The length of the sea from the west is 1,700 miles, and its greatest width is about 700 miles.

CARIBOU, the American reindeer, which is now rarely found south of Canada, but which was formerly common as far south as Wyoming. Caribou roam about in the summer, but in winter they gather together in herds, feeding on winter berries and the leaves of shrubs. Their large hairy hoofs enable them to travel easily in the snow. They have large antlers, one branch of which extends over the forehead in front. Caribou are protected from extermination in Canada and the United States by game laws. See REINDEER.

CARIOATURE, *kar'i ka ture*, a grotesque picture or representation of a person or thing, the peculiarities being so exaggerated as to appear ridiculous. The art is an old one and was practiced by the Egyptian and Assyrian artists, as well as by the Greeks and Romans. It was popular among all the European nations during the Middle Ages. The invention of printing made it possible to circulate caricatures more freely, but in many countries there was so little liberty allowed by the rulers that the art could not flourish. With the greater freedom of the press the growth has been more rapid. At the present time most of the daily papers and many of the magazines publish caricatures, which influence public opinion almost as much as that which is written. In the United States, *Judge* and *Life*; in England, *Punch*; in France, *Charivari*; in Germany, *Fliegende Blätter* are periodicals devoted to caricature and humor.

Thomas Nast, who originated the Tammany tiger, the Republican elephant and the Democratic donkey, was one of the earlier American caricaturists. He has been followed by Davenport, Outcault, Oppen, McCutcheon, Briggs, Darling, Fox, Orr and others. Some of the greatest caricaturists of the world were produced by England, including Hogarth, Cruikshank, Tenniel and Du Maurier.

CARILLON, an elaborate arrangement of tuned bells, more efficient than ordinary chimes, containing in excess of 50 bells, ranging through two octaves, with sharps

and flats. The bells are stationary, and are struck by clappers through electric impulse from a keyboard manipulated by a skilled musician. Carillons are placed in towers. They were first known in Belgium. In Canada in the Dominion Parliament building is one of 53 bells. Riverside Church, New York, has one with 72 bells. The Singing Tower, in central Florida, the "Taj Mahal of America," gift of Edward Bok, has a carillon of 61 bells; their weights vary from 16 pounds to 11 tons. This carillon is on Florida's highest point of land. See BOK, EDWARD; SINGING TOWER.

CARLETON, *kahr'l'ton*, GUY, Sir (1724-1808), a British soldier and colonial governor, who held the chief command of the British army at the close of the Revolutionary War. He served during the French and Indian Wars in America, in 1766 was appointed lieutenant-governor, and in 1775 governor, of Quebec. Later he took supreme command of the British forces in Canada, successfully repelled the American attacks in the early years of the Revolution and was raised to the rank of lieutenant-general. In 1777 Carleton was superseded by Burgoyne, but at the close of the war succeeded Sir Henry Clinton as commander in chief. For his service he was created Baron Dorchester by the king and was granted a pension of £1,000 a year. From 1786 to 1796 he was again governor of Quebec, proving a popular and able administrator.

CARLETON, WILL (1845-1912), an American poet who gained a wide circle of readers among those who enjoy verse that touches upon everyday life. Homely philosophy, genial humor, pathos and a gift for simple, natural rhythm are the chief characteristics of his poetry. He was born in Hudson, Mich., and was graduated at Hillsdale College in that state. Soon after he left college he began to lecture in various parts of the United States and Canada. In his lectures he always delighted his audiences by reciting from his own writings. His best known works are poems of domestic life, compiled as *Farm Ballads*, *Farm Legends*, *Farm Festivals* and *City Ballads*.

CARLOS I (1863-1908), king of Portugal, was the son of King Luiz I and Queen Maria Pia, daughter of King Victor Emmanuel II of Italy. In 1886 he married Marie Amelia, daughter of the Duke of Orleans. In 1889 he ascended the throne. On

Feb. 1, 1908, Carlos and his eldest son were shot by revolutionists while driving in Lisbon. Manuel, his second son, ascended the throne, assuming the title of Manuel II. In 1910 he was deposed, a republic was established, and Manuel went to England to live.

CARLOVINGIANS. *kahr lo vin'je anz.*

See CAROLINGIANS.

CARLSBAD CAVERNS NATIONAL PARK, a series of connected caverns of unusual magnificence and almost unbelievable extent, discovered by a cowboy in 1901 and erected into a national park in 1930. The size of the caverns is yet to be determined. They are on three levels, the first 750 feet below the surface, the second 900 feet, and the third at a depth of 1,320 feet. There may be still lower levels. What is known as the Big Room is one and one-half miles from the entrance; it is 4,000 feet long, in one place 650 feet wide, and its extreme height is 300 feet. The limestone formations are beautiful beyond description. In a section of one cavern not entered by visitors nearly 3,000,000 bats live. The park is in almost the extreme southeastern part of New Mexico.

CARLSRUHE, *kahr'ls roo'e*, or **KARLSRUHE**, GERMANY, an important manufacturing city in the southwestern part of the country, capital of the grand duchy of Baden, in the days of the German Empire. It lies five miles east of the Rhine, and about forty miles northwest of Stuttgart. As one of the great industrial centers of southwestern Germany, Karlsruhe was an important munitions center during the World War, and a target for allied airmen. The city is noted for its handsome streets, squares, parks, monuments and public buildings. Its most notable edifices include the palace of the grand duke, from which seventeen streets radiate like an outspread fan; the court theater; a court library possessing 190,000 volumes; and a number of fine museums. Karlsruhe dates from the erection of a hunting palace built in 1715, by the Margrave Carl Wilhelm. Population, 1933, 154,902.

CARLYLE, *kahr lile'* THOMAS (1795-1881), a British essayist of the Victorian period, one of the most forceful writers in English literature. He was a bitter opponent of sham and hypocrisy, and he unceasingly upheld the dignity of labor and the beauty of sincerity. Carlyle was of Scottish descent. He was born at Ecclefechan, Dum-

frieshire. He was intended for the Church and in his fifteenth year was sent to the University of Edinburgh, where he developed a strong liking for mathematics. He abandoned all plans for the ministry when he convinced himself that he did not believe the theology of his time, and on leaving the university in 1814, without taking a degree, he became a teacher of mathematics at the academy in Annan. In 1816 he accepted a position in Kirkealdy. Creative literature was his goal, however, and in 1818 Carlyle went to Edinburgh. Here he supported himself by miscellaneous writing and tutoring, though he persevered in the work that he loved. His real career as an author began with the publication, by the *London Magazine* (1823-24), of his *Life of Schiller*, which was enlarged and published separately in 1825. In 1824 he published a translation of Legendre's *Geometry*, with an essay on proportion, by himself, prefixed, and in the same year appeared his translation of Goethe's *Wilhelm Meister*. Carlyle's *Specimens of German Romance* was published in 1826, the year in which he married Miss Jane Baillie Welsh.

Although there is no doubt that the author and his wife were genuinely and deeply attached to each other, their life was far from peaceful, owing to Carlyle's temper and his wife's critical nature. After their marriage they lived for a time in Edinburgh, and then withdrew to Craigenputtock. Here he wrote a number of critical and biographical articles for various periodicals; and here, too, he wrote *Sartor Resartus* (the tailor mended), the most original of his works, the publication of which soon made him famous. He removed in 1834 to London, and three years later he brought out his *French Revolution*, a vivid, dramatic picture of that great movement.

During the years that followed Carlyle delivered several series of lectures, the most important of which is *Heroes and Hero-worship*. *Chartism*, published in 1839, and *Past and Present*, in 1843, were small works bearing on the affairs of the time. In 1845 appeared his *Oliver Cromwell's Letters and Speeches, with Elucidations*, and in 1850 his *Latter-day Pamphlets* came out. He next wrote a life of his friend John Sterling, published in 1851. The largest and most laborious work of his life, *The History of Frederick the Great*, next appeared, the first

two volumes in 1858, the second two in 1862 and the last two in 1865; and after this time little came from his pen. In 1866, having been elected lord rector of Edinburgh University, he delivered an installation address to the students on the *Choice of Books*. While still in Scotland the sad news reached him that his wife had died suddenly in London. For the rest of his years he lived much in retirement, and he died in 1881 in Chelsea. Carlyle's *Reminiscences and Life*, with the *Letters of Jane Welsh Carlyle*, were published by James Anthony Froude, Carlyle's literary executor, and for a time Carlyle's reputation suffered greatly by some of the revelations contained in these works.

Carlyle's intense hatred of sham was expressed in the fiercest satire, and he attempted to drive men, rather than to lead them, toward the truth he loved. The style of his works, which are everywhere distinguished by his disjointed, rugged sentences and his fiery appeals, is on the whole a true picture of the man.

CARMAN, ALBERT (1833-1917), a Canadian clergyman, born in Dundas County, Ontario. He was educated at the Dundas County grammar school and Victoria University, Cobourg. Carman was principal of the Dundas County high school from 1853 to 1857, when he was chosen chancellor of Albert University (later united with Victoria College). He was elected a bishop of the Methodist Episcopal church in 1874, and was its general superintendent from 1884 until his death. Dr. Carman was widely known as a preacher and orator. He died in 1917. (For portrait, see article CANADA.)

CARMAN, [WILLIAM] BLISS (1861-1929), a Canadian lyric poet whose works show his richness of imagination and rare gift for writing melodious verse. He was born in Fredericton, N. B., and was educated at the University of New Brunswick and at Harvard and Edinburgh. His early literary work consisted of magazine and editorial writing, through which he gained a favorable reputation, and his first volume of verse, *Low Tide on Grand Pré*, was well received when it appeared in 1893. This was followed by a number of other volumes of poems, including *Songs from Vagabondia* (with Richard Hovey), *Pipes of Pan*, *Ballads of Lost Haven* and a *Winter Holiday*. Representative of several volumes of prose essays are his *Kinship of Nature*, *Friendship of Art*

and *The Making of Personality*. His latest works are *Earth Deities* (1914) and *April Airs* (1916).

CAR'MEL, a range of hills in Palestine, extending from the Plain of Esdraelon to the Mediterranean Sea. It has a length of about sixteen miles and its highest point is 1,850 feet above the sea. According to I Kings XVIII, 19-40, it was on this range that the burnt offering was consumed by fire from heaven in answer to Elijah's prayer.

CAR'MELITES, an Order of monks of Our Lady of Mount Carmel, claimed by some to have been founded by the prophet Elijah, but as far as known, founded by Count Bertrand in 1156. Bertrand, with ten companions, went to Mount Carmel in Palestine and established the Order, but on account of the Mohammedan persecution they were obliged to remove and located in Cyprus. The habit of the Order was brown, with a white cloak, from which they were known as the white friars. The Carmelites are characterized by their self-denial in eating and drinking, and by the simple life which they lead. They were first confined to monasteries, but in the thirteenth century their Order became mendicant, and in the sixteenth century one branch of the order was known as the Barefooted Carmelites.

CAR'MEN, a popular and melodious opera based on a novel by Prosper Mérimée, a French writer. The music was also composed by a Frenchman, Georges Bizet, but the opera has a Spanish background. It is the story of a fascinating Spanish girl whose coquetry gains for her the love of Don José, a soldier. Later she accepts the attentions of a famous toreador and drives her rejected lover to a frenzy of jealousy, in which he stabs her. Since its first production in 1875, in Paris, *Carmen* has been unceasingly popular because of its wealth of melody and dramatic episodes. Patti, Mary Garden and Geraldine Farrar have been successful interpreters of the rôle of Carmen, the name part, but probably the greatest Carmen of all time was Emma Calvé.

CARMINE, *kahr'min*, a beautiful red dye derived from the dried bodies of a class of insects found in Mexico and Central America (see COCHINEAL). This coloring matter is used in silk dyeing, in miniature painting and in manufacturing of artificial flowers, rouge, red ink and water colors.

CARNATION, *kahr na'shun*, the name given to many cultivated varieties of the clove pink. Carnations are among the most popular of cultivated flowers, because of their beauty, their fragrance, their long life after they have been picked, and because they blossom at all seasons of the year if properly cared for. Under culti-



CARNATION

vation, in place of the original lilac or the wild pink of southern Europe, the carnation has assumed a wide variety of forms and tints.

CARNEGIE, *kahr neg'i*, **ANDREW** (1837-1919), an American capitalist and philanthropist, who made a huge fortune but spent a large portion of it for the good of mankind. He was born at Dunfermline, Scotland, whence his father, a handloom weaver, emigrated to America in 1848. The family, consisting of Andrew's parents, himself and a younger brother, settled in Allegheny city, Pa., near Pittsburgh, where there was a Scottish colony. Andrew worked as bobbin boy at \$1.50 a week in the cotton factory where his father had found employment, and at the age of fourteen became a messenger in the Pittsburgh telegraph office at \$2.50 a week. He learned to translate the code, and at sixteen was made an operator. By 1859 he was division superintendent on the Pennsylvania Railroad. A fortunate acquaintance with the sleeping-car patentee laid the foundation of his success; then came prosperous ventures in oil and the starting of a rolling mill, from which has grown the largest system of iron and steel industries in

the world. He was the head of the Carnegie Steel Company, the largest single interest in the formation of the United States Steel Corporation in 1901. In that year he retired from business, devoting himself thenceforth to travel, literature and philanthropy. He gave away over \$360,000,000, and died worth \$22,152,011.

CARNEGIE FOUNDATION FOR THE ADVANCEMENT OF TEACHING, founded by Andrew Carnegie in 1905 and incorporated by Congress in 1906. The institution was endowed with a fund of \$15,000,000, which within his lifetime was increased to more than \$27,000,000. It is administered by a board of twenty-five trustees. While the avowed object is to provide retiring pensions for teachers in universities, colleges and technical schools of the United States, Canada and Newfoundland, in its practical application it has become an important factor in higher education. In effect, it has established uniform rules to which institutions must conform if they would enjoy its benefactions, thus standardizing requirements for students' entrance, etc., tending to break down sectarian management of schools and establishing what will result in greater uniformity in the work of professional schools. In 1913 Carnegie added an educational research fund of \$1,250,000 to the original endowment.

CARNEGIE HERO FUND. In 1904 Andrew Carnegie set apart a fund of \$5,000,000 for the purpose of rewarding heroic actions. The field covered by the endowment embraces the United States, the Dominion of Canada and Newfoundland, and the income is used to give financial aid to those incapacitated for work, either temporarily or permanently, in heroic attempts to save human life, and to give aid to widows and orphans of heroes. Gold, silver and bronze medals are also given. Since the original endowment similar funds have been set aside in Great Britain and Ireland, France, Germany, Switzerland, Belgium, Netherlands, Sweden, Norway, Italy and Denmark.

CARNEGIE INSTITUTE OF TECHNOLOGY, an important scientific school, located at Pittsburgh, had its beginning in a library donated in 1886 by Andrew Carnegie. Today it includes the technological college, a concert hall, museum, art gallery, and library. The endowment is about \$28,000,000; the faculty numbers 300; there are 2,500 students.

CARNEGIE INSTITUTION, an institution founded by Carnegie in 1902 for the purpose of promoting higher education and original research. The plan is similar to that of the Smithsonian Institution. No degrees are granted, and no special grade of scholarship is required for admission to the privileges which the Institution offers. According to the terms of the gift the scientific departments of the government are to place their records and museums at the disposal of the students. The institution was incorporated January 4, 1902. The grant specifies the following purposes of the institution: 1. To promote original research. 2. To discover exceptional men in the various departments of study. 3. To increase facilities for higher education. 4. To increase the efficiency of universities and other institutions. 5. To insure prompt publication and distribution of the results of scientific investigation. The administration building is in Washington, D. C.

CARNEGIE LIBRARIES, public libraries numbering 2,800 that have been established in English-speaking countries, the gift of Andrew Carnegie. His plan was to offer to any community a sum for the establishment of a public library, provided the community would pledge itself to devote for the permanent maintenance of the library a sum equal to one-tenth of the donation. Within 35 years, ending in 1915, over \$62,500,000 had been thus expended, and the movement has not only helped to extend general education, but has encouraged professional training for librarians and aided in establishing a uniform type of library edifice.

CARNEGIE PEACE FUND, a fund of \$10,000,000 set aside in 1910 by Andrew Carnegie to aid the cause of international peace. The income is administered by a board of trustees. There are three forms of activity, relating respectively to economics and history, to international law and to intercourse and education. This organization is working in coöperation with other peace societies in various parts of the world. It issues year books showing the scope of its activities, and distributes numerous books and pamphlets. It is significant that the executive committee issued a declaration in 1917 supporting strongly the entrance of America into the World War.

CARNELIAN, *kahr neel'yan*, or **CORNELIAN**, a red variety of chalcedony, usu-

ally of a clear, rich color. It takes an excellent polish and is used in common jewelry for seals, bracelets, necklaces and other ornamental articles. It was employed by the ancients for carving and engraving purposes, and has been used by the superstitious as a charm.

CARNIVORA, *kar niv'o rah*, or **CARNIVOROUS ANIMALS**, an important order of animals whose group name refers to their flesh-eating habits. The order includes animals of varied size and habitat, but all have large, strong teeth with sharp cutting edges, so they can cut and tear the flesh-food with ease. All except the bears walk on the under surface of their toes.

The carnivora are natives of every country, with the possible exception of Australia, but the distribution of many species is peculiar and interesting. Bears are not found in Madagascar, and only one species is known in the tropical regions. The only carnivora in Madagascar are practically peculiar to the island. The raccoon family is peculiar to the New World, while nearly all of the badger, sable and otter groups are confined to the Old World. No hyenas are found in the New World. In one group are the seals, sea lions and walruses, all of which are aquatic, and most of which are confined to the ocean; all these are more or less fish-like in form, and in general their limbs are enclosed within the skin.

Related Articles. Consult such titles in these volumes as relate to flesh-eating animals, among which are the following:

Cat	Leopard
Coyote	Lion
Dog	Skunk
Ichneumon	Wolf

CARNIVOROUS PLANTS, a group of plants of many different species, that use for food small animals, especially insects. Most of these plants live in moist places, where there is an absence of nitrogen, which is supplied by the insects. The sundews or droseras, the most common, have small, thick leaves supplied with sticky, sensitive hairs which hold and press around the insect when it alights. In the Venus's flytrap the leaves are modified into hinged traps provided with bristles. The pitcher plants also belong to this group. See VENUS'S FLYTRAP; PITCHER PLANTS.

CARNOT', MARIE FRANÇOIS SADI (1837-1894), a French statesman, President of the French Republic from 1887 to 1894. He

was educated as an engineer and advanced rapidly in his profession, until he was appointed prefect of the lower Seine, during the siege of Paris, in 1871. After the fall of the city he was made a member of the National Assembly, and in 1886 he took office in the Brisson cabinet. On the resignation of Grévy in 1887, Carnot was elected President of France. During a celebration given in his honor at Lyons he was killed by an anarchist.

CAROLINGIANS, *kar o lin' je anz*, the second dynasty of the French or Frankish kings, which supplanted the Merovingians. They derived their name from Charles Martel. Charles Martel was mayor of the palace and virtual ruler under the weak Merovingian kings, and his son, Pippin the Short, after serving for a time as mayor of the palace, became king in 751. Pippin was succeeded by Charlemagne and his brother Carloman. Charlemagne became sole king in 771 and was succeeded in the Empire of the West by his son Louis the Pious. The latter divided his empire among his sons, and at his death (840) his son Charles the Bald became king of the part of his territory which corresponds to modern France. Charles died in 877, and was succeeded by a number of feeble princes. The dynasty came to an end with Louis V, who died in 987.

CAROTID ARTERIES, the two great arteries which convey the blood from the aorta to the head and brain. The *common carotids*, one on each side of the neck, divide each into two parts. One is the *external* branch, which passes up to the angle of the lower jaw, where it sends branches to the neck, face and outer parts of the neck; the other is an *internal* branch, which passes deeply into the neck, then, through an opening in the skull behind the ear, enters the brain and supplies it and the eye with blood. A wound in the carotids, unless it be a puncture, results in almost immediate death.

CARP, a family of fresh-water fishes native to Southwestern Asia, but now acclimated in all parts of the world. Carp is a favorite food fish of Europe, but because of the coarseness of its flesh it is not so well liked in the United States. It thrives and multiplies rapidly in ponds and sluggish streams, and the United States Fish Commission has stocked many such bodies of water with it. The *leather* carps have no scales. Other species are brilliantly colored, while still others are dull. See **GOLDFISH**.

CARPA'THIAN MOUNTAINS, a range of mountains in Southern Europe, an eastern extension of the Alpine system, though not so lofty as the Alps and invested with less scenic grandeur. They extend in a wide semi-circular sweep from the northern boundary of Czechoslovakia southeast and south through Rumania into Bulgaria. Between Rumania and Bulgaria the Danube River cuts its way. A part of the range in Bulgaria is known as the Transylvanian Alps. The highest peak reaches 8,737 feet; the average elevation is 5,000 to 7,000 feet. Metals and minerals abound in generous quantities, particularly gold, silver, lead, and copper. Half a million soldiers of Russia and the Austro-German forces died in World War battles in these mountains.

CARPENTER, FRANK GEORGE (1855-1924), an American newspaper correspondent and geographical writer, born at Mansfield, O. In 1879 he began to write for the *Cleveland Leader*, and about ten years later traveled around the world as correspondent for a newspaper syndicate. He visited nearly every quarter of the globe, and pictured for his readers life in lands far remote from them. He was widely known for his series of popular geographical readers, embracing *How the World is Fed*, *How the World is Clothed* and *How the World is Housed*.

CARPENTER, J. ALDEN (1876-), an American composer, born in Park Ridge, Ill., and educated at Harvard. His compositions, which include songs, ballets for opera, suites for the orchestra, and other instrumental music, are French in style, but often distinctively American in theme. His ballet *Skyscrapers*, produced by the Metropolitan Opera in 1926, suggests the machine age and its many noises. Carpenter's suite entitled *Adventures in a Perambulator* has been played by the leading orchestras of the world. Among other works is his *Song of Faith*, for orchestra and chorus, which was performed at the Washington bi-centennial in 1932.

CARPENTER-BEE, a common name of a solitary bee which burrows into wood for a short distance and then excavates a tunnel for a foot or more lengthwise of the grain. Beginning at the bottom, the bee lays her eggs each in a separate cell, one above another, and all are filled with a plentiful supply of food for the larvae. See **BEE**.

CARPET, a floor covering made of wool, cotton, hemp, or other material. Woven

carpets were first used in Oriental countries and were woven in one piece, but now they are made in narrow strips, to be sewed together. They were introduced from the East into Europe. The first carpet factory in Europe was established in Paris in 1607. The chief carpets now in use are the following: *Brussels* carpets come from Brussels, Belgium, and are the most common in the United States and Canada. The back is of linen, and the face of raised worsted loops. These carpets are woven in simple patterns of not more than five colors. *Wilton* carpets, made in Wilton, England, are similar to Brussels in manufacture, except that the loops are cut open and sheared smooth so as to make a velvetlike surface. The *moquette* carpet, made in the United States, looks like the Wilton, but is made by fastening little tufts of woolen thread to a canvas back. The *ingrain* is an all-wool carpet, woven with two or three webs of different colors. It is smooth-finished on both sides and is usually reversible.

Though the Latin word *carpita*, from which *carpet* is derived, means *rug*, the terms are not synonymous to-day. Rugs are usually woven all in one piece and cover only part of a floor. They are rapidly replacing carpets wherever floors are of hardwood, because they are more artistic and more sanitary. See **RUGS**.

CARPETBAGGERS, the name first given to Northern politicians who took up their residence in the Southern states after the Civil War in order to become representatives of those states in Congress and to control local politics. It was later especially applied to adventurers from the North who from 1865 until 1876 attempted to control the Southern states by becoming leaders of the colored voters. During this period the better class of whites was largely excluded from voting by the reconstruction measures of Congress. The state governments were administered by coalitions of unscrupulous whites and ignorant negroes, which levied heavy taxes, squandered public money in reckless extravagance and speculation and burdened the states with vast debts. These governments were known as carpetbag governments. See **RECONSTRUCTION**.

CARPET BEETLE, a small beetle sometimes called the *buffalo moth*, about one-eighth of an inch long, marked with black, white and red. The larva is a short, hairy

grub that feeds on carpets and woolen clothing. It is a very destructive animal, and its extermination is often very difficult. Pyrethrum powder and naphtha balls are helpful. In homes where rugs and hardwood floors have supplanted carpets these bugs are not found.

CARPET SWEEPER, a device consisting of a roller brush inclosed in a dustpan, attached to a long handle. It is used to sweep floor coverings. In sections where electricity is available the carpet sweeper is being replaced by the vacuum cleaner.

CARRACCI, or **CARACCI**, *kah rah'che*, a family of Italian painters, founders of a school of art where the best features of all the great masters were emphasized. There were three members of the family who gained special renown, Ludovico (1555-1619), Agostino (1557-1602) and Annibale (1560-1609). Ludovico painted a number of religious canvases and sacred frescoes. Annibale chose not only religious subjects, but landscapes, examples of which are to be found in various European galleries. Agostino was both a painter and an engraver, winning distinction in both fields.

CARRANZA, *kah rah'n'zah*, **VENUSTIANO** (1860-1920), a Mexican statesman, the leader of the counter-revolution which deposed Huerta. He belonged to the Mexican aristocracy and was a wealthy landowner and judge. A staunch supporter of President Madero, Carranza became leader of the former adherents of the deposed President when General Huerta overthrew the government, and in 1912 he was acclaimed First Chief of the Constitutionalists. After many months of civil war he became the real ruler of Mexico, and his position as such was formally recognized by the United States in October, 1915. Carranza proved to be unable to check lawless activities of the bandit Villa, but an expedition of United States troops into the country did not meet with his approval, and his opposition brought the two countries close to warfare (see **MEXICO**, subhead *History*). In March, 1917, he was legally elected President of Mexico, and was inaugurated on May 1. He faced continual revolutions, and in May, 1920, was forced to flee the capital city. Within a few days he was assassinated. See **VILLA**, **FRANCISCO**.

CARRARA, *kah rah'rah*, **MARBLE**, a fine grade of crystalline limestone found in the mountains near the city of Carrara, Italy.

The stone is of a pure white color, and when polished has a beautifully smooth surface. It has been used to make many famous statues, and also provided the material for the Pantheon at Rome. About 10,000 men are employed in the quarries near Carrara, and though the mines have been worked for twenty centuries, there is no diminution in the supply.

The city of Carrara is in the northern part of the country, three miles from the port of Avenza, through which most of the marble is shipped. Population, 1933, 58,511 (including suburbs). See MARBLE.

CARREL, ALEXIS (1873—), one of the greatest biologists and surgeons of the twentieth century. Though born and educated for the profession of surgery in France, Dr. Carrel first attained world-wide renown through his experiments made at the Rockefeller Institution for Medical Research, in New York, where he began working in 1909. In 1912 he was awarded the Nobel Prize in medicine. Among his most important achievements are the surgical grafting of limbs, the transplanting of organs, such as kidneys, and the maintaining of life, growth and functional activity for protracted periods of time in organs and tissues apart from the body. In 1914, on the outbreak of the World War, he returned to France to give his services to the wounded, and as a result of his labors and those of his associates a new method for the sterilizing and healing of infected wounds was discovered. This process is known as the Carrel-Dakin treatment. In 1930 he received a prize for cancer research.

CARRIAGE, *kair'ij*, a wheeled vehicle, especially designed for carrying passengers. The important parts of a carriage are the body, seat, top, hood, dashboard, apron, step, springs, running gear, perch, forward gear, clip, fifth wheel, tongue, shafts, singletree, doubletree, axle and wheel. The essential parts of wheel are the hub, spoke, felloe and tire. The body of the carriage is usually made of hard wood. It is put together with mortises and tenons, held by screws and glue and strengthened with iron braces. The top in some carriages, as in the coach, is supported on wooden uprights; in others it is made of an iron frame, which can be folded or opened into a braced position. This frame is covered with leather or canvas. The gear is made of wood and iron. The hubs, felloes, spokes and shafts and the frame to which the

axles are attached are of wood. The axles are of steel, and the hubs are fitted with steel boxes. In the modern types of carriages the wheels revolve on ball bearings and have rubber tires. Since the introduction of the automobile, the horse-drawn carriage has practically disappeared from highways and city streets, and many carriage and wagon factories have been converted to other uses, many of them into automobile factories, especially in the United States.

CARRIER, COMMON. See COMMON CARRIER.

CARRIER PIGEON, *pij'un*, or **HOMING PIGEON**, a variety of the common domestic pigeon, so called because it can be trained to carry messages from and back to its home. Carrier pigeons are large birds with long wings, a large mass of naked skin at the base of the beak and a circle of naked skin around the eyes. Their speed is marvelous, and the distance through which they can fly without rest seems almost incredible. An American homing pigeon is known to have made a journey of 1,040 miles without stopping. These birds cannot be induced to fly away from home, and are teachable merely because of the strong instinct which tells them where home is and leads them to fly straight to it.

During the World War large numbers were trained to carry messages from different parts of the field of operations, and they were found to be a valuable supplement to the aeroplane and telegraph service. They fly at a height of about half a mile.

CARROLL, CHARLES, of Carrollton (1737-1832), an American statesman of the Revolutionary period, born at Annapolis, Md. At the outbreak of the Revolution he was the wealthiest man in the colonies and used his influence and means freely for the aid of liberty. In 1776 he was elected to the Continental Congress from Maryland and signed the Declaration of Independence. He was again a delegate to Congress in 1777 and served on the committee which visited Valley Forge to investigate complaints about General Washington. In 1788 Carroll was elected the first Senator from Maryland under the Constitution of the United States, serving until 1791. He was the last surviving signer of the Declaration of Independence. He called himself "Carroll of Carrollton" to distinguish himself from others named Carroll.

CARROLL, LEWIS. See DODGSON, CHARLES.

CARROT, *kair'ut*, a plant of the parsley family, whose slender, tapering root is widely used as a table and stock food. Carrots are grown from seed and belong to the biennial group; that is, their period of growth lasts through two seasons. They can be easily grown in a soil containing sand and clay, and they do not require much attention. The roots are white, reddish or yellow, but those cultivated for the table are smaller and of a finer grain than those intended for stock. Carrots are fed to dairy cattle, because they improve the quality of milk. As a table food they compare favorably with other vegetables, as they are nine per cent sugar. If cooked whole or cut into large pieces, carrots will lose less of their sugar content in boiling than otherwise. The plant contains a coloring matter sometimes employed in tinting butter. In some sections dried carrot is used as an adulterant of coffee.



CARROT

CARSON, CHRISTOPHER (1809-1868), an American frontiersman, better known as "Kit Carson," was born in Madison County, Kentucky. In 1826 he began the adventurous life which made his name known everywhere in the West as the symbol of ingenuity and daring. In that year he accompanied a party of hunters to New Mexico, later went several times to the Pacific coast and acted as hunter for western army garrisons. He was with Fremont in several expeditions across the Rockies and also occasionally assisted western ranchers in driving cattle and sheep for long distances through the wild western country. Appointed United States agent to the Utah and Apache Indians in 1854, he performed notable service for the government, through his friendship with influential chiefs, and during the Civil War, as a scout in the southwest, he acted with great energy and skill in behalf of the Union, being brevetted brigadier-general at the close of the war. In cunning, quickness, resourcefulness and daring, he rivaled, if he did not excel, the most expert Indians.

CARSON, EDWARD HENRY, Sir (1854-1935), a British statesman, the most active leader of the Irish party opposing Home

Rule. Born in Dublin, and a graduate of the university in that city, he entered the British Parliament as member of the university in 1892, and from that time on was one of the most prominent figures in all matters pertaining to Ireland. Though prone to go to extremes, he was a brilliant debater. As the Home Rule question became more acute Carson stood out as the great leader of the Ulstermen in their opposition to the government program. When the Home Rule Bill finally passed Parliament, in 1914, the Ulstermen prepared to prevent its application by force of arms, with Carson at their head, but the outbreak of the World War postponed a settlement of the vexed problem. In 1915 Carson was appointed Attorney-General in the Asquith Ministry, but resigned in a few months. In December, 1916, when Lloyd George formed a new Cabinet, he was appointed First Lord of the Admiralty, but in 1917 he resigned to become a member of the War Cabinet without portfolio. In 1918, when the Irish question again reached a crucial stage, he resigned his Cabinet position; from 1921 to 1929 he served as Lord of Appeal in Ordinary, a judicial post.

CARSON CITY, Nev., was founded in 1851 and was named for "Kit" Carson, the famous scout. It is on the Virginia & Truckee Railroad, thirty-two miles south of Reno. The city has been the capital of the state since 1861, and is the county seat of Ormsby County. Besides the state capitol there is a Federal building, and the government supports here an Assay Office, which handles millions of dollars of bullion annually, and the city has one of the finest libraries in the West. The state prison is two miles from the city, and The Carson Indian School is three miles distant. Population, 1930, 1,596.

CARTAGENA, or CARTHAGENA, *kahr-ta je'na*, COLOMBIA, a fortified seaport on the Caribbean Sea, capital of the state of Bolivar. The prominent buildings are a cathedral, a government building, a theatre and educational institutions. The place has manufactories of candles and chocolate, and carries on the export of cattle, hides, fine woods, tobacco and precious stones. Population, 96,000.

CARTAGENA, or CARTHAGENA. SPAIN, a seaport in the province of Murcia, situated on a bay of the Mediterranean Sea. Its harbor, which is one of the largest and

safest in the Mediterranean, is sheltered by lofty hills. It is a naval and military station, the arsenal containing barracks, docks, hospitals and machine shops. Lead smelting is largely carried on, and there are in the neighborhood rich mines of excellent iron. Esparto grass, used in making cordage, is grown in the neighborhood. This grass and lead, iron ore, oranges and other fruits are exported. Among the buildings worthy of note are the Hospital Militar, the Presidio and the Gothic cathedral of the thirteenth century. Cartagena was founded by the Carthaginians under Hasdrubal about 243 B. C., and was called New Carthage. It was taken by Scipio Africanus (210 B. C.) and was long an important Roman town. Later it was ruined by the Goths but was revived in the time of Philip II. Population, 102,542.

CARTE BLANCHE, *kahrt blahNsh*, a word meaning *white paper*, is a blank paper authoritatively signed and entrusted to a person to fill up as he pleases. Thus, in 1649 Charles II tried to save his father's life by sending from the Hague to the Parliament a signed *carte blanche*, to be filled up with any terms which they would accept as the price of his safety. In 1832 Earl Grey was said to have been armed with a *carte blanche* for the creation of new peers. The term is now used figuratively to mean a gift of unlimited powers.

CARTERET, GEORGE, Sir (?-1680), an English loyalist whose name is associated with the colonial history of New Jersey. When the Civil War broke out in England between Charles I and Parliament, Carteret took the side of the king and served in the navy; after the Parliament had triumphed, he joined the French navy. Charles II, on his restoration, rewarded him and gave him, in company with Lord Berkeley, the territory which was given the name of New Jersey, in America. When, about ten years later, it became necessary to divide the territory, Carteret received East Jersey for his share. See **NEW JERSEY**, subhead *History*.

CARTHAGE, an ancient and celebrated city on the northern coast of Africa, the people of which waged three wars with Rome between 264 B. C. and A. D. 149. According to an old legend, Carthage was founded by Dido, a Phoenician queen, in 878 B. C., but it is more probable that it was founded about 850 B. C. by Tyrian merchants, as a trading post. It was situated about twenty miles

south of Utica and near the site of modern Tunis. The city was built on a peninsula about three miles wide, across which was a triple wall of towers. All the sides were defended by walls, and a double harbor served for merchants' ships and for the navy. At its height, Carthage had a population probably greater than that of Rome, amounting, it is said, to 700,000, and it also had the largest navy in the world.

The Carthaginians gradually acquired dominion over the other Phoenician colonies of northern Africa and over the neighboring tribes, and the city soon became one of the greatest of commercial centers. Early in the sixth century B. C. the Carthaginians were allies of the Phoenicians, who in Sicily were crowded by the Greeks. After checking the Greeks, they reduced the coast of Sardinia, founded colonies there and gained control around the western Mediterranean and in Spain. Their first wars of importance were with the Greeks in the fifth century B. C., over the control of Sicily. The results were successes on each side and the final abandonment of the island by the Greeks. Rome was in the meantime conquering Southern Italy, and thus the two nations were brought together. The wars which followed are called the Punic Wars (see **PUNIC WARS**). In 149, Rome, after a desperate siege of two years, captured the city and destroyed it by fire.

The Emperor Augustus rebuilt Carthage in 29 B. C., and the new city became one of the finest in the Roman Empire, but to-day there are no remains of it but a portion of its wall. It was destroyed once for all by the Arabs in 647.

CARTHAGE, Mo., founded in 1833 but destroyed during the Civil War and afterwards rebuilt, is the county seat of Jasper County, 150 miles south of Kansas City, on the Saint Louis & San Francisco, the Missouri Pacific and the Carthage & Western railroads. The industries largely center in lead, zinc and quarrying; there is an important shoe factory. A Federal building was erected at a cost of \$75,000; there is a Carnegie Library and the city has two hospitals. Carthage Ozark College occupies a campus of 37 acres, and has property valued at \$400,000. There is a Memorial Hall which seats 2,000 people, and an airport. The site of the battle of Carthage, in the Civil War, is a public park. Population, 1920, 10,053; in 1930, 9,736.

CARTHUSIANS, *kahr thu'zhanz*, an Order of monks founded in the eleventh century by Saint Bruno of Cologne, who with six companions went to the village of Chartreuse in the Alps, far above sea level, and built a small convent, donned coarse garments and lived as hermits. The members of the Order fast frequently and eat no flesh or fish except what is given them. They usually have one meal a day, and this consists of bran bread. The dress is white, except a long black cloak and hood worn outside the monastery. The Carthusians were, from the beginning, well educated and given to hospitality and charity. At one time they had the finest convents in the world, of which La Grande Chartreuse, in France, and the Certosa di Pavia, south of Milan, are among the most celebrated. They originated the famous liqueur *chartreuse*.

CARTIER, *kahr tyä'* GEORGES ETIENNE, Sir (1814-1873), a Canadian statesman. He was born at Saint Antoine, Quebec, and was graduated in law at the College of Saint Sulpice, in Montreal. Cartier was called to the bar in 1835 and gained a large practice. He took an active part in the rebellion of 1837, headed by Louis Papineau, but gradually changed his views so that after his election to Parliament in 1848 he soon became an acknowledged leader of the more liberal wing of the Conservatives. In 1855 he was appointed provincial secretary and two years later attorney-general for Lower Canada. From 1857 to 1862 Cartier was joint Premier of Canada with Sir John A. Macdonald. He took a prominent part in progressive legislation, such as the abolition of seigniorial tenure, the reform of civil law, and the development of the Grand Trunk Railway. He carried Quebec into the Confederation against great opposition and served till his death as Minister of Militia and Defense in Macdonald's first Cabinet.

CARTIER, JACQUES (1494?-1557), a French navigator whose explorations in North America gave France the basis of its claim to the mainland of Canada. On his first voyage to the New World, in 1534, he explored the Gulf of Saint Lawrence, sailing through its northern entrance, the Strait of Belle Isle, and proceeding as far as Anticosti Island. Taking possession of the mainland in the name of Francis I, he returned home to prepare for a second voyage. On this expedition (1535), Cartier discovered the Saint

Lawrence River. He followed the stream as far as a small Indian village on the site of the present capital of Quebec. That city takes its present name, Montreal, from the hill that Cartier called Mount Royal (Mont Réal).

CARTILAGE, *kahr'tilaj*, or **GRISTLE**, *gris'nl*, a pearly white, firm and very elastic tissue, occurring in vertebrate animals. When cut, the surface contains no visible cells, cavities or pores. It enters into the composition of those parts which must be firm yet easily bent. *Temporary cartilages* are substitutes for bone in the earlier periods of life, and they finally become bone. The extremities of the long bones at birth are cartilage. A good illustration of a temporary cartilage is found in the breast-bone of a chicken. The *permanent cartilages* are attached to the extremities of bones in the formation of a joint, are found in the external ear, aid in forming the nose and are the foundation of the eyelids, the trachea and the larynx.

CARTOON', a term used at the present time to designate a picture intended to ridicule some notable character, party, belief or movement, or to emphasize by means of a pictorial sketch some important event. *Cartoon* has thus come to mean about the same as *caricature* (which see).

Originally the term was applied to a drawing made on heavy paper or cardboard, and used as a model for a large picture in fresco, tapestry or oil color. The cartoon is made exactly the size of the picture intended, and the design is transferred to the surface to be ornamented by tracing or other processes. The most famous cartoons are those painted by Raphael for the Vatican tapestries. Originally there were twenty-five, but they were neglected and changed hands so many times that now only seven remain, and these are at the South Kensington Museum, London. Some of the subjects represented are *Paul Preaching at Athens*, *The Miraculous Draught of Fishes*, *The Death of Ananias* and *The Sacrifice at Lystra*.

CARTOUCHE, *kahr toosh'*, a term applied to a tablet used for ornament or for receiving inscriptions, generally in the form of a scroll unrolled. In Egyptian architecture, cartouches were the oval or elliptical figures carved on monuments and temples to receive hieroglyphic inscriptions of different kinds. In heraldry the term denotes a kind of oval

shield, much used by the Popes and princes in Italy, and others, both clergy and laity.

In later usage the word signified a roll of paper or other material which held a charge of powder; the term *cartridge* is a corruption of *cartouche*.

CARTRIDGE, *kahr'trij*. For civilian use a cartridge is a cylindrical case of metal suited to the bore of a gun and filled with a charge of powder. The bullet fits tightly into the open end. The charge is exploded by a primer, in the center of the flat, closed end. Cartridges for great guns are in bags and contain only the powder. The first cartridge cases for rifles were made of copper, and the practice yet continues to some extent, but brass is now generally employed, and is made in one piece, with a solid head.

A *blank cartridge* has powder only, and while the explosion is as loud as though it contained a bullet it is harmless except for danger of powder-burns at close range.

CARTWRIGHT, EDMUND (1743-1823), an English inventor whose fame rests on his contributions to the art of weaving. At the age of forty he turned his attention to mechanics, and in 1785 he brought his first power loom into action. Although much opposed both by manufacturers and workmen, this loom made its way and in a developed and improved form is now in universal use. He also invented a wool-carding machine, a rope-making device and a steam engine which burned alcohol. Cartwright received a grant of \$50,000 from Parliament in 1809. See LOOM; WEAVING.

CARUSO, *ka roo'zo*, ENRICO (1873-1921), an Italian operatic singer, born in Naples. As a boy he sang in churches, and he began systematic study at the age of eighteen, under Guglielmo Vergine. Upon completion of his study he began at once his operatic career, singing in the principal cities of Europe, and appearing in America first in 1903, in New York City. There he won almost instant success, becoming the most celebrated tenor of the day. Caruso's popularity was due to a voice of remarkable power, sweetness and range. In dramatic ability he was distanced by his celebrated contemporary, Muratore, but he never failed to charm his audiences. Caruso's talking-machine records bring prices as high as seven dollars. The operations he underwent jeopardized his future as a singer, and he returned to Naples, where he died, surrounded by his family.

CARVER, JOHN (1575-1621), the first governor of Plymouth Colony, in the New World. He was born in England and went to Leyden, then a refuge for the Puritans. He was an elder in the church and in 1620 sailed with the Pilgrims in the *Mayflower*, being unanimously elected governor before the landing. Carver was a prudent and firm ruler. He died at Plymouth the April following his arrival, from the effects of a sunstroke. See PLYMOUTH COLONY.

CARVING, as a branch of sculpture, the process of cutting a hard body, usually ivory or wood, into some particular shape by means of a sharp instrument. This art was common in ancient times among the Babylonians, who carved ivory and practiced gem engraving to a considerable extent. In early ages statues of the gods were made of wood, painted, and clothed with colored draperies. Carving in both ivory and wood became general for the decoration of the early Christian churches. During the last part of the Middle Ages, the art of wood carving was brought to a high degree of perfection in Germany, where it was practiced especially in the decoration of shrines and altars. The carving was very elaborate, sometimes representing whole scenes from well-known legends of the saints. In most countries of Europe the art has been largely displaced in recent times by molded work of various kinds and by metal casting, but wood carving has retained its importance in Switzerland.

CARY, *ka'ri*, ALICE (1820-1871) and PHOEBE (1824-1871), two sisters, writers of poetry of the reflective and sentimental type. Born on a farm in Ohio, and enjoying only the meager privileges of a rural school education, these sisters nevertheless kept their ideals high, and in early womanhood they were writing verses for local papers. They were encouraged by Whittier and Horace Greeley to try a broader field, and in 1851 they removed to New York. There they remained for twenty years, companions until their death. The poetry of the Cary sisters is still read and loved, though they have not quite the vogue they attained in their own day. Phoebe is probably best remembered for her appealing hymn *Nearer Home*, beginning—

One sweetly solemn thought
Comes to me o'er and o'er—
I am nearer home to-day
Than I ever have been before.

Alice, who had more delicacy of imagination, but less wit and animation than her sister, wrote one lyric that was warmly praised by no less severe a critic than Edgar Allan Poe. This is her *Pictures of Memory*. The poems of the Cary sisters have been published together. The best biography of the poets is *A Memorial of Alice and Phoebe Cary*, by Mary C. Ames.

CARYATIDES, *kari at'i dcez*, or **CARYATIDS**, the name applied in Greek architecture to the figures of women dressed in long robes, standing upright in graceful positions and used as columns to support a roof. The most celebrated of these figures appear on the southwest porch of the Erechtheum, Athens. The corresponding male figures are called *Atlantes*.

CASABA, *kah sah'bah*, **MELON**, a large kind of muskmelon, so called because it came originally from Cassaba, in Asia Minor. Its flesh is yellow and of a very agreeable flavor. On the outside the Casaba melon has lengthwise grooves, as have other muskmelons, but it lacks the network of lines seen on the ordinary varieties. Casabas are now common in American markets, but their popularity is of comparatively recent date.

CASABIANCA, *kah zah byahng'kah*, the boy hero of the Battle of the Nile, whose name has been perpetuated in a poem by Felicia Hemans. Its opening lines are well known because they have been so often parodied:

The boy stood on the burning deck,
Whence all but him had fled—

but nevertheless the poem relates the story of a real Casabianca, the ten-year old son of the captain of the *Orient*. This ship was the flagship of Napoleon's fleet. During the battle the commanding admiral was killed, and the captain of the *Orient* took charge. He told his little son to remain on deck until he was given permission to leave, and the lad remained when everyone had fled because his father lay wounded and unconscious. Father and son perished in an explosion which destroyed the vessel.

CASCADE, *kas kade'*, **RANGE**, a range of mountains in the United States, British Columbia and Alaska, near the Pacific coast, to which it is parallel, extending from the Sierra Nevada range, in California, northward to Alaska. In the United States, the Columbia and Klamath rivers cut their way

through these mountains to the sea, forming deep gorges or canyons noted for the beauty of their scenery. The range contains several active volcanoes. The highest peaks are Mount Shasta, 14,510 feet; Mount Rainier or Tacoma, 14,408 feet; Mount Adams, 12,490 feet, and Mount Hood, 11,225 feet. These mountains are of volcanic origin, and the highest peaks are extinct volcanoes.

CASCADE TUNNEL, a tunnel on the Great Northern Railroad through the summit of the Cascade Mountains, in Washington. The length is 13,413 feet, or 2.6 miles. This is prolonged by extending the lining 200 feet at each end, to take the place of snow sheds. The width is sixteen feet, and the height is twenty-one feet six inches. The lining is of concrete and varies in thickness from twenty-three inches to three feet six inches.

CASCARA, *kas'ka ra*, a fluid extract of the cascara buckthorn, or California buckthorn. It is employed with other laxatives by physicians for the relief of constipation. It is nearly always one of the ingredients of so-called liver pills.

CASCARILLA, *kas ka ri'la*, a term applied to several different medicinal barks, but used most often to designate the bark of a small shrub found on the Bahama Islands. From this bark is prepared a medicine used in some cases of dyspepsia, chronic bronchitis and certain fevers. It has the effect of increasing the flow of the digestive juices, but if taken in too large quantities it is nauseating.

CASCO BAY, a bay of Maine, between Cape Elizabeth on the southwest and Cape Small Point on the northeast. Within the bay are more than 300 small islands, most of which are very fertile; almost all are occupied by summer residences. Portland is situated on the west side of the bay, which forms one of the best harbors on the Atlantic coast.

CASEIN, *ka'se in*, that substance in milk which is coagulated by the action of acids, and which constitutes the chief part of the nitrogen contained in it. Cheese made from skimmed milk and well pressed is fully half casein. Casein is one of the most important elements of animal food found in milk and such plants as beans and peas. It consists of carbon, hydrogen, nitrogen, oxygen and sulphur.

CASHMERE, *kash meer'*. See **KASHMIR**.

CASHMERE GOAT, a variety of goat found in Tibet and India, remarkable for its fine, silky fleece. From the fleece is made the costly cashmere (or kashmir) shawl, formerly a garment of fashion in America. The colder the region where the goat pastures, the heavier is its fleece. A full-grown goat yields not more than eight ounces of the valuable down which underlies the long hairs. A large shawl of the finest quality requires five pounds, and one of the inferior quality requires from three to four pounds. The flesh of the cashmere goat is suitable for food, and when well cared for the animal gives a rich milk. These goats have been successfully introduced into France and Germany. See GOAT.

CASH REGISTER, a machine for recording the cash received for sales in retail stores. It consists of a metallic box, with keys arranged similarly to those on a typewriter, each key representing an amount purchased, from one cent up to from one to five dollars, depending upon the size of the machine. When the amount of the purchase is beyond the limit of the machine, it can be registered by pressing two or more keys at once. When the key is pressed, it throws a tablet, showing the amount of purchase, into such a position that it can be seen both by the customer and the salesman, and at the same time it opens the cash drawer. It also registers the amount purchased on a long roll of paper, turned forward by a system of wheelwork that is under lock and key. The amount of the day's sales is determined by adding the various amounts registered on this roll. Calculating attachments are now commonly employed in cash registers. These machines cost from \$50 to \$750. See CALCULATING MACHINES.

CASIMIR-PERIER, *ka ze meer' pa ryá'*, JEAN PAUL PIERRE (1847-1907), a French statesman, President of the republic from 1894 to 1895. He was trained for a political career, but during the Franco-German war greatly distinguished himself, receiving the cross of the Legion of Honor. In 1874 he was elected to the Chamber of Deputies, and three years later he entered the Cabinet as Under-Secretary of State. He formed a Ministry in 1893, but it was of short duration. On the assassination of Carnot in 1894, he was elected President of the French republic, but he resigned in less than a year.

CASINO, *kas se'no*, another spelling for CASSINO (which see).

CASPIAN, *kas'pi an*, **SEA**, the largest interior body of water on the globe, lying ninety-six feet below sea level, on the border between Europe and Asia. It is bounded on the east by Persia, and on the other three sides by Russian territory. The Caspian has an area of about 170,000 square miles, over five times that of Lake Superior, and is fed by several large rivers, including the Volga, the Ural and the Kura. It abounds in shallows, making navigation difficult. The water is less salt than that of the ocean, is of a bitter taste and of an ocher color. Astrakhan and Baku are the chief cities on its shores. During the World War the country along the western shore of the Caspian was overrun by the Turks; the city of Baku was demanded both by Germany and Turkey as one of the spoils of war, when the Central empires were confident of winning the war.

CASS, LEWIS (1782-1866), an American statesman, one of the builders of the Middle West. He became brigadier-general of the regular army during the War of 1812, and in 1813 was appointed governor of the territory of Michigan. During seventeen years of service he laid the foundations of American civilization in the country under his control by his far-seeing policies and good judgment. General Cass became Secretary of War under Jackson in 1831, served as Ambassador to France from 1836 to 1842, and in 1845 was elected United States Senator from Michigan. It is an interesting fact that the first definite mention of squatter sovereignty (which see) occurs in a letter of his, dated in 1847. Cass served as Secretary of State in Buchanan's Cabinet, but resigned in 1860 because the President refused to safeguard Federal interests in the South. He was an aspirant for the Presidency in 1848, but was defeated by Taylor the hero of the Mexican War.

CASSANDRA, *ka san'dra*, in Greek legend, a daughter of Priam and Hecuba. She was endowed by Apollo with the gift of prophecy, but when she refused to accept his love, he became angry, and because he could not take from her the gift which he had bestowed, he ordained that no one should believe her prophecies. She frequently foretold the fall of Troy and warned her countrymen against the stratagem of the Wooden Horse (which see). No attention, however, was paid to her warnings. In the drama *Agamemnon*, written by Aeschylus, the

prophetess is carried away to Greece by Agamemnon and murdered there by Clytemnestra, the wife of Cassandra's captor.

CASSAVA, *ka sah'vah*, a South American shrub, from the starchy root of which is obtained the tapioca of commerce. The plant grows about eight feet in height, and bears broad, shining, hand-shaped leaves, and beautiful white and rose-colored flowers. There are two species of cassava, bitter and sweet, but the roots of both are valuable. From bitter cassava is obtained a juice used in making a sauce called casareep. The shrub is cultivated in the West Indies, Florida, Central America and other tropical regions. In South America it is known as *manioc* and *yuca*. See **TAPIOCA**.

CASSEL, or **KASSEL**, *kahs'sel*, GERMANY, under the Empire until 1919 the capital of the province of Hesse-Nassau, Prussia, on the Fulda River, ninety-one miles north-northeast of Frankfurt-on-the-Main. Cassel is one of the most beautiful towns of its size in Germany. There are numerous fine buildings and educational and charitable institutions, and the municipal art gallery possesses a collection of rare value. The city has manufactures of machinery, mathematical instruments, iron wares, chemicals, knives, gloves, leather and porcelain. Population, 1933, 175,200.

CASSIA, *kash'ah*, a large genus of plants belonging to the pea family and found in the tropical parts of the world. The cassias consist of trees, shrubs or herbs. The leaves, which are compound, usually bear glands on their stalks. The leaflets of several species constitute the well-known drug called senna, and both leaves and flowers are used as medicines. *Cassia bark* is a common name for the bark of an entirely different plant, belonging to the laurel family. Its flavor resembles that of cinnamon, and as it is cheaper it is often substituted for it. The cassia of the Bible was probably cassia bark.

CASSINO, or **CASINO**, *kas se'no*, a simple game played by two or more persons with a full pack of cards. The cards are dealt one at a time to each of the players and to the center of the table, in succession, until four have been dealt to each. Those on the table are turned face up. The player at the left of the dealer begins by taking from the table any cards that have the same value as one in his hand; or he may take any number of cards, the sum of whose spots equal any card

in his; as, an eight will take all other eights, a six and a two, a five and a three, a three and a three and a two or any combination that makes eight. The player can play but one card in his turn, and if he can take none with it, he lays it upon the table, face up. He may, however, *build*; for example, if there is a two on the table and he has a three in his hand, he may lay this three upon the two and call five, providing he has in his hand a five with which to take the pile at his next turn. He may also build a pair upon the table, providing he has a third card of the same denomination with which to take the pair.

An opponent may build from his hand on any pile excepting a pair. When the four cards have been played in rotation, four more are dealt to each player, and so on until the pack is exhausted. When all the cards have been played to the table, the one who takes the last "trick" has also the cards that remain. The points that count are Little Cassino (the two of spades), 1; Big Cassino (the ten of diamonds), 2; each ace, 1; the greatest number of cards held by a single player, 3; the greatest number of spades held by a single player, 1. If at any time a player can take all the cards from the table, except in the last hand, it is called a *sweep* and counts 1 to the player. The usual game is 21 points.

CASSIOPEIA, *kas i o pe'yah*, a bright constellation in the northern hemisphere, often called the "Lady in her Chair." It contains fifty-five stars, five of which, ar-



CASSIOPEIA

ranged in the form of a W, are of third magnitude. For the myth concerning Cassiopeia, see the article **ANDROMEDA**.

CASSITERITE, an ore of tin, from which most of the metal is obtained. It consists of seventy-nine parts of tin and twenty-one parts of oxygen. Cassiterite is found in

Cornwall, England; Saxony; the Malay Peninsula; at Banca, Australia; and in Mexico and the United States. See TIN.

CASSOWARY, *kas'owa ri*, a large bird belonging to the same family as the ostrich and emu, a native of New Guinea. The bird stands about five feet high. Its peculiar



CASSOWARY

feathers hang down its sides, resembling long hair, its head and neck are bare and bluish in color, and its head is crowned by a bony crest of brilliant blue, scarlet and purple. The wings of the cassowary are so short that it is unable to fly, but its legs are powerful and it can run with great speed. To the natives it is a valuable bird, as it can be domesticated, and they use its plumage for head decorations, rugs and mats. Its flesh is edible.

CAST, in art, a representation or impression of a statue, bust or other model, by means of wax, plaster of Paris or some other substance. The model is covered with the plaster, so applied as to form a kind of shell over the surface, and is divided into sections which can be removed, one at a time. The different sections are put together when dry and form the mold; the mold is filled with liquid plaster, which soon hardens and is a reproduction of the model. See SCULPTURE.

CASTANETS, a musical instrument composed of two small concave shells of ivory or hard wood, shaped like spoons. When played the shells are placed together, fast-

ened to the thumb and beat with the middle finger. This instrument is used by the Spaniards and Moors as an accompaniment to their dances and guitars.

CASTE, meaning *breed* or *race*, is a term applied to a class or section of a people who are marked off from others by certain restrictions, and whose burdens or privileges are hereditary. It was originally applied to the classes in India whose occupations, customs, privileges and duties are hereditary. It is probable that caste was originally grounded on a difference of descent and mode of living, and that the separate castes were originally separate races. It now prevails principally in India, but it is known to exist or to have existed in many other regions. See BRAHMANISM.

CASTILE, *kastel'*, an ancient kingdom of Spain which formerly occupied a large part of what is now the Spanish peninsula, extending southward from the Bay of Biscay. Castile is interesting because of its historical associations. It was the ancient kingdom which formed the nucleus of the Spanish monarchy. In the latter part of the fifteenth century Isabella, heir to the throne of Castile, married Ferdinand, king of Aragon, and the two kingdoms were at first nominally and then formally united. Castile was one of the strongest states in the conflict with the Moors, and it was largely due to its military strength that these people were expelled from Europe. Isabella and Ferdinand were the two monarchs who sent Columbus on the expedition which discovered America.

CASTLE, a great building of stone, of several stories, with thick walls surmounted by numerous watch-towers, comprising a veritable fortification, the home of a powerful baron of the Middle Ages. Around the seat of a king grew his capital city; his home was likely to be the greatest castle of the realm. The king invested his barons with vast distant estates within the realm, imposing upon them strict allegiance to him, including defense of his person and kingdom in time of stress. In turn, the baron established himself in a castle upon his domain, and ruled his lands with all the power of an absolute monarch, subject only to the favor of the king. The king held the lord responsible for all public duties within his barony.

The feudal lord's castle was intended to be an impregnable fortress, built for protection against outside enemies, against not infre-

quent revolt of his peasant retainers, and on rare occasion against the king himself, when the latter's exactions became unreasonable and especially when his rule was weak and his power so slight as to encourage revolt. Around the castle were clustered the habitations of his retainers, grouped as near it as possible, for protection in an age of peril. Theoretically, the lord was their benevolent protector; actually, in most instances, a despot, autocratic and domineering. He measured out his favors in what were known as *fiefs*—lands to one, revenues to another for special service, to another the right to operate a small industry. The owner of a fief became a *vassal* of his lord, pledged to promote his every interest, including service in war. Below the vassals, in the lowest stratum of baronial society, were the *serfs*, or laborers, who for the favor of a mere living (a small portion of what was produced), were likewise forced to every possible service in behalf of their lord. They were bound to the soil, little better than slaves, and considered a part of the estate.

The Castle of the Lord. Having presented a picture which made the castle the seat of the social and political system of its age, we may consider the architectural ingenuity which developed this feudal stronghold. It was intended not only as a residence, but primarily as a fortress, and was invested with every device known to the time to withstand attack and assure safety to the lord and his family.

In rugged country, the castle was built upon the topmost height of a precipitous hill. Such a location made frontal attack almost impossible, and rendered it easy for defenders to hurl projectiles downward upon a foe. On level country, to make approach to the walls very difficult, a deep ditch entirely surrounded the castle, wide enough to prevent crossing and filled with water to a depth of several feet. This surrounding waterway was called a *moat*. Across the moat, in front of the main entrance, was a *drawbridge*, hinged at the inner end so that it could be raised, like the modern jack-knife bridge, thus preventing approach over the moat. The great arched entrance was narrow, so it would not permit mass entrance; moreover, it was protected by a *portcullis*, a thick door which opened neither in nor out, but was raised and lowered from the inside. When it was lowered, entrance to the castle was im-

possible, unless beseigers were able to batter it down with their mechanical engines of war.

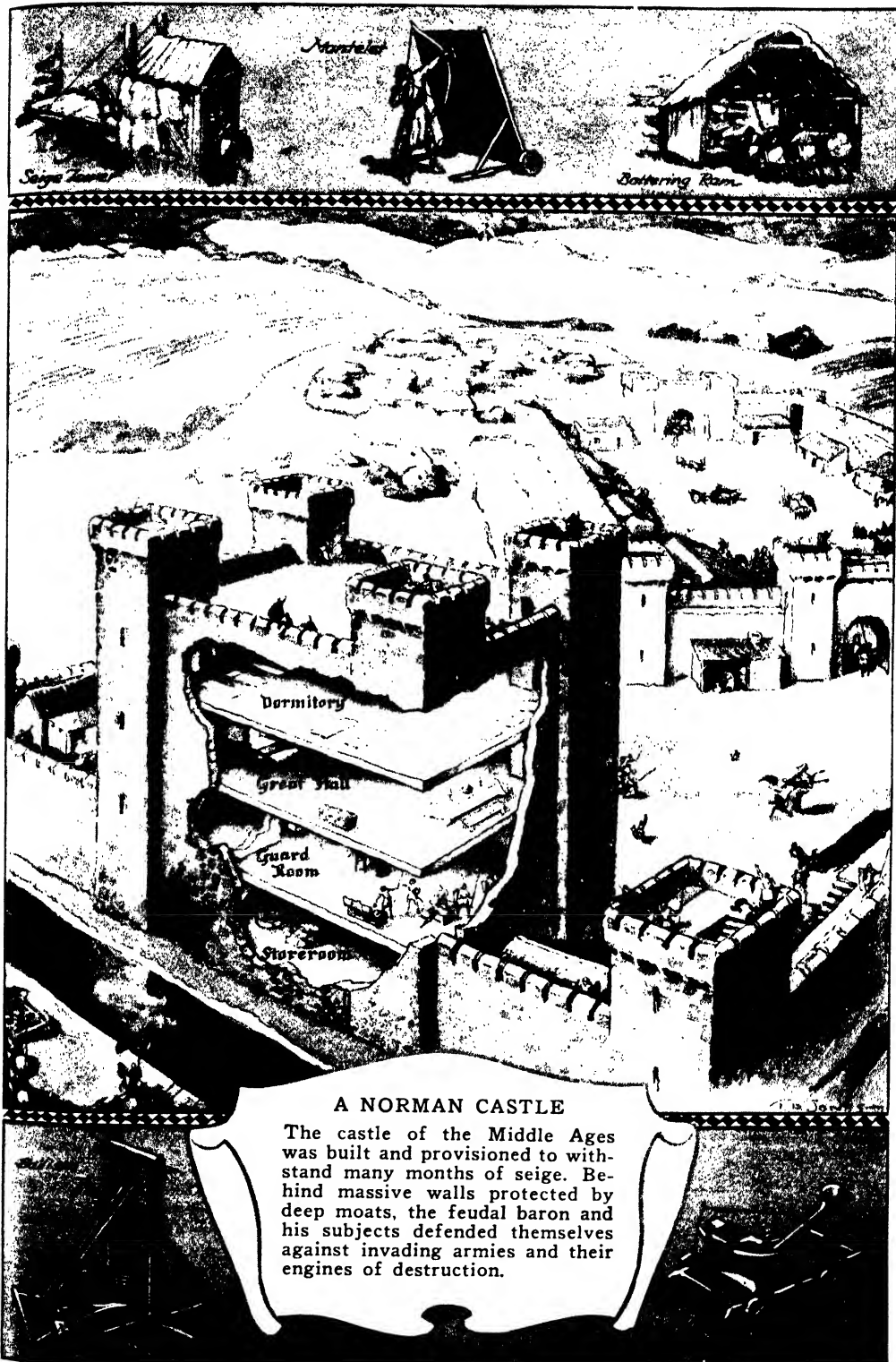
Many castles of the kind just described were built with concentric walls—walls within walls. If an enemy passed the moat and drawbridge and battered down the portcullis, the defenders might retire behind the second wall, and possibly behind a third, in the course of defense of the lord and his possessions. In any castle, the strongest and the innermost sanctuary was called the *donjon* or *keep*, and here lived the lord. The windows which pierced the masonry in the several stories of the castle were narrow, for better defense against arrows and burning brands. On the top of the outer walls were numerous towers; they might be called "fighting tops," to borrow a modern nautical term, and they could be shut off from other parts of the castle and defended independently, in case of necessity.

With the invention of gunpowder even the strongest castles lost their impregnable character, though they continued in residential use for a few centuries. Some are yet family seats, but most of those yet standing are no longer habitable. Wherever one is found today it adds a picturesque feature to the surrounding country and is a reminder of the romance as well as the stern realities of the Middle Ages.

CASTOR OIL, the oil obtained from the seeds of the castor oil plant. It is a native of India, but is now distributed over all the warmer regions of the globe. The oil is obtained from the seeds by bruising and pressing. That which first comes away, called cold-drawn castor oil, is considered the best. The castor oil of commerce, which is used as a purgative, is chiefly imported from India. The taste of castor oil is very disagreeable, and can be swallowed without a feeling of nausea only when it is enclosed in a capsule or within a small piece of fruit. This plant is often cultivated in gardens for ornament



CASTOR OIL PLANT



A NORMAN CASTLE

The castle of the Middle Ages was built and provisioned to withstand many months of siege. Behind massive walls protected by deep moats, the feudal baron and his subjects defended themselves against invading armies and their engines of destruction.



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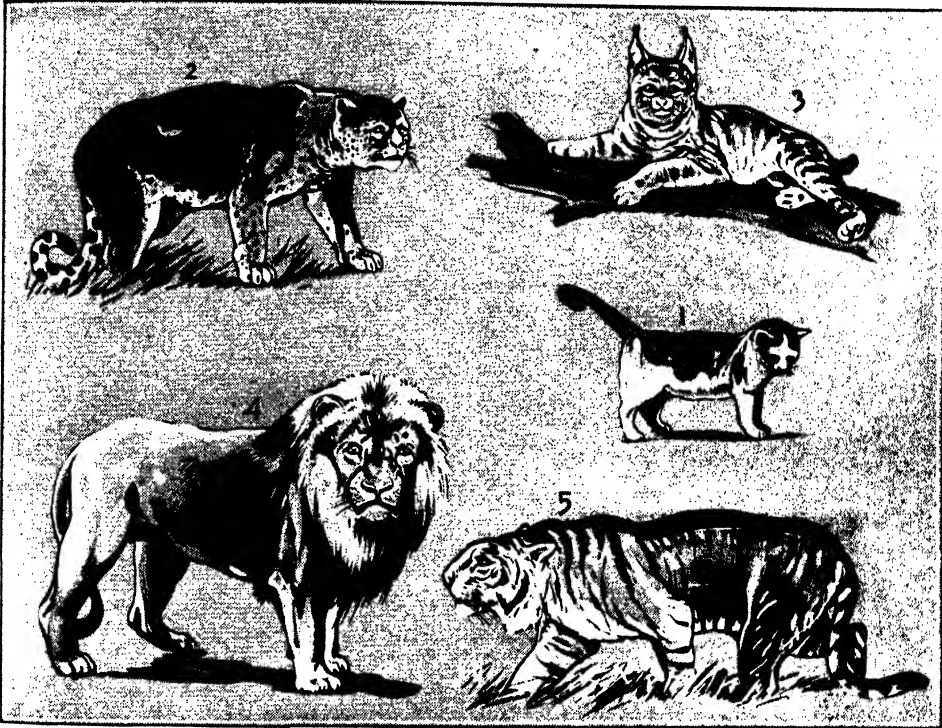
ONCE MIGHTY STRONGHOLDS

The castle above belonged to the kings of Bavaria (Germany) before the World War. Below, a castle, now in Czechoslovakia, a relic of the days of serfdom.



CAT, the name of the commonest of the household pet animals, is also applied to the family to which the cat belongs. This family includes the fiercest wild animals known, including the lion, tiger and panther. It is believed that the cat was originally domesticated in Egypt, where it was loved and venerated. The domestic cat belongs to a genus better armed for destruction of animal life

Among the various breeds or races of cats, the *tailless cat* of the Isle of Man, and the *Persian cat*, with its long, silky fur, are among the most curious. The *tortoise shell*, with its color a mixture of black, white and brownish or fawn color, the large *Angora* and the *blue*, or *Carthusian*, and *Maltese* cats, with long, soft, grayish-blue fur, are other well-known species. See **ZOOLOGY**.



SOME MEMBERS OF THE CAT FAMILY

1. Cat. 2. Jaguar. 3. Lynx. 4. Lion. 5. Tiger.

than any other quadrupeds. The short and powerful jaw, sharp, pointed teeth, sharp claws and strong muscles make it a fierce enemy of birds and other small animals. Birds have no greater enemy, and one cat often drives the beautiful, friendly singing birds from a whole neighborhood. The cat is usually regarded as less intelligent than the dog, but possibly it has equal intelligence of another kind. It seems to have little real affection for mankind, though it enjoys being petted and shows signs of jealousy if neglected. It does become strongly attached to places, and it often will desert its friends who have removed, and return to the strangers who occupy its old home.

CATACOMBS, *kal'a kohmz*, caves or subterranean places for the burial of the dead, the bodies being placed in graves or recesses hollowed out in the sides of the cave. Caves of this kind were common among the Phoenicians, Greeks, Persians and many Oriental nations. In Sicily and Asia Minor numerous excavations have been discovered, containing sepulchers, and the catacombs near Naples are remarkably extensive. The term is said to have been applied originally to the district near Rome which contains the chapel of Saint Sebastian, in the vaults of which, according to tradition, the body of Saint Peter was first deposited; but usually, in speaking of the catacombs, we mean those subterranean

burial places just outside the walls of Rome, which were made by the early Christians. They consist of long, narrow galleries, usually about eight feet high and five feet wide, which branch off in all directions, forming a perfect maze of corridors. When one story of them was no longer sufficient, staircases were made, and a second line of galleries was dug out beneath. The graves, or *loculi*, were cut into the walls of the gallery, one above another, to receive the bodies. They were closed laterally by a slab, on which there was occasionally a brief inscription or a symbol, such as a dove, an anchor or a palm branch, and sometimes all of these.

The decorations have given us our chief information concerning art during the first four centuries of the Christian Era. Some of the inscriptions and epitaphs are beautifully carved, some are merely scratched upon the slab and others are painted in red and black. In later times beautiful frescoes were common, in which are indicated the Christian faith and devotion. It is now regarded as certain that in times of persecution the early Christians frequently took refuge in the catacombs, since burial places had the right of protection by law, and gathered there to celebrate in secret the ceremonies of their religion.

The term has also been applied to certain ancient subterranean quarries in Paris, which have been used since 1786 as burial places. It is said that six million bodies lie in these catacombs, where the bones are arranged in fanciful designs along the sides of the passages.

CATALEPSY, a condition in which a person suddenly becomes unconscious and remains rigidly fixed in the attitude which he had assumed when the attack seized him. The attack may terminate quickly or it may continue for some time; the latter is liable to be the case when insane persons are attacked. The action of the heart and lungs continues, and the pulse and temperature remain natural. Catalepsy is generally the consequence of some other disease.

CATALINA, *kat a le'na*, **ISLAND**, an island of the Santa Barbara group, near Los Angeles, Cal., containing 47,000 acres. Tourists visit it in large numbers because of the fine climate and the beautiful submarine gardens off its shores. Visitors are rowed about in glass-bottomed boats, through which they may look upon all sorts of fish and sea-

weed of varied hues and fantastic form. The island is about twenty miles long and from one to nine miles wide. Its surrounding waters have been made a fish reservation by act of the California legislature, and there the development of the tuna fishing industry has assumed great importance.

In 1919 the island was purchased by the manufacturer of a popular brand of chewing gum, for \$3,000,000. It has become widely known as a pleasure resort, and especially as a training ground for baseball players.

CATALPA, *ka tal'pa*, a desirable shade tree of rapid growth, with large, gay, trumpet-shaped flowers of a distinctive odor. Pods, nearly a foot long, follow the flowers and sometimes remain on the trees throughout the winter. Some species of catalpa are natives of Japan and China, while others belong to the United States and Southern Canada. The wood is used in making railroad ties and fence posts.

CAT'AMOUNT, the wild cat. The name is also given to the tiger and the puma. See **WILD CAT**.

CATANIA, *ka tah'ne a*, a city on the east coast of Sicily, in the province of Catania, at the foot of Mount Etna, fifty-nine miles southwest of Messina. It has been repeatedly visited by tremendous earthquakes, one of the worst of which was in 1693, when it was almost entirely destroyed; and it has been partially laid in ruins by lava from eruptions of Mount Etna. The city was one of the most flourishing of Greek cities in Sicily and was important under the Romans. The ruins of the amphitheater, which was more extensive than the Colosseum at Rome, are still to be seen, as are the remains of the theater, baths, aqueducts, sepulchral chambers, hippodrome and several temples. Catania has a considerable trade, and it manufactures silk and other fabrics, besides lava and amber ware. It exports grain, fruits, sulphur and wine. Population, 1931, 227,765.

CATAPULT, *kat'a pult*, a weapon used in ancient times for the purpose of throwing heavy stones, iron bars and similar missiles. It operates on the same principle as the crossbow or the boy's slingshot (see **SLINGS**). There was a revival of the old weapon during the World War in the use of various devices for hurling poison-gas bombs, grenades, etc.

CATARAOT, *kat'a rakt*, a disease of the eye, in which the crystalline lens, or its cov-

ering, becomes opaque. Impairment of the vision, ranging to complete blindness, results. The earliest approach of cataract is marked by a loss of the natural color in the pupil, which, as the disease progresses, appears to have a milk-white or pearly color. Cataract is most common in elderly people and is quite painless. It is treated by different surgical operations, all of them consisting in removing the diseased lens from its position opposite the transparent cornea. No medical treatment is successful. See EYE.

CATARACT, or **WATERFALL**, the descent of a stream over a ledge or precipice occurring in its course. The terms *cataract*, *waterfall*, *cascade* and *rapids* are often used to designate the same thing, but the following distinction may be made: If the volume of water is large, as at Niagara, the fall is a *cataract*; if the volume is small, the fall is a *cascade*; slight falls of a few feet, like those in the Saint Lawrence River, are called *rapids*. All of these forms are waterfalls.

A cataract is caused by a harder layer of rock, which does not wear away as rapidly as the formations below. The river gradually wears down the channel below this obstruction, and this creates a rapid or fall, according to the nature of the formation and the slope of the bed. In case of a deep, narrow channel worn below the projecting rock, a waterfall with nearly vertical descent is the result, like the falls at Niagara and Victoria Falls in the Zambesi Africa. When a series of obstructions occurs, one below the other, rapids are formed. Cataracts are most numerous in mountain streams, where many of them are of great height and of remarkable beauty. The largest cataracts in the world are Victoria Falls in Africa, which are about a mile wide and nearly 400 feet high; Niagara Falls, which have a width of over 4,000 feet and a height of 167 feet; and the Iguassu Falls in South America, 180 feet high. See NIAGARA FALLS; VICTORIA FALLS; IGUASSU FALLS.

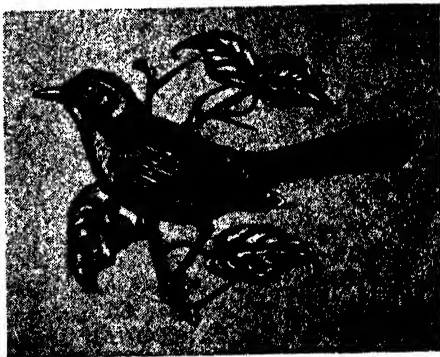
CATARRH, *ka tahr'*, an increased secretion of mucus from the membranes of the nose, throat, bronchial tubes or other parts of the body. Catarrh, as popularly recognized is a disease of the nasal passages, throat or bronchial tubes only, but it is known by physicians to result wherever the mucous membrane becomes inflamed, whether caused by exposure to cold, the breathing of impure air, constipation or other agency. Catarrh of the

nasal passages should never be neglected, for it is a common cause of impaired sight and hearing.

CATAWBA, *ka tau'ba*, a tribe of Indians that formerly inhabited North and South Carolina. Pontiac was a descendant of the Catawbas. These Indians were friendly to the Americans in the Revolution, and were very hostile to the Iroquois and other tribes of the north. Only about 100 of an original 4,000 remain; they are found on a reservation in York County, South Carolina.

CATAWBA RIVER, or **GREAT CATAWBA RIVER**, a river in North Carolina, rising in the Blue Ridge. Below Rocky Mount, S. C., the stream is called the Wateree. The Catawba is about 250 miles long.

CAT'BIRD, a common American bird, so named because one of its calls sounds like the mewling of a cat. It is found in the Northern and Middle States and Canada, in thickets and shrubberies, where it lives an active



CATBIRD

existence, chiefly in the pursuit of insects. Its plumage is a deep slate color above and lighter below, with a reddish-brown patch on the lower tail coverts. Its song is varied and fine, largely in imitation of the songs of other birds. In winter it retires to the extreme southern parts of the United States, or even to Mexico and Central America.

CATECHISM, *kat'e kiz'm*, an elementary book containing a summary of principles in any science or art, but particularly in religion, reduced to the form of questions and answers. The first regular catechisms appear to have been compiled in the eighth and ninth centuries, those by Kero of Saint Gall and Otfried of Weissenburg being most famous. Among protestants the catechisms of Luther (1518, 1520 and 1529) acquired great celeb-

city and continue to be used in Germany. The catechism of the Church of England in the first book of Edward VI, March 7, 1549, contained merely the baptismal vow, the creed, the ten commandments and the Lord's prayer, with explanations. The part relative to the sacraments was added at the revision of the liturgy, during the reign of James I. The catechism of the Church of Scotland is that agreed upon by the Assembly of Divines at Westminster, with the assistance of commissioners from the Church of Scotland and approved of by the General Assembly in the year 1648. What is called the *Shorter Catechism* is merely an abridgement of the *Larger* and is the one in most common use.

CATECHU, *kat'e choo*, a resinlike substance obtained from the wood of certain species of acacia found in India. It is employed in tanning and dyeing, and is used medicinally as an astringent. In the East the natives chew it. Catechu is extracted from the heartwood, small chips of which are boiled in water until the extract is nearly as thick as tar. The mass is then allowed to harden and is formed into balls. These are wrapped in leaves and thus placed on the market. *Cutch* is a familiar commercial name of this product.

CATERPILLAR. Mrs. Sigourney has written a child's poem about a butterfly, in which the beautiful insect sings as it flies through the sunny air, "I was a worm till I won my wings." Truly the ancients never conceived a myth more beautiful and wonderful than this familiar story of nature—the life history of the butterfly. The gay, winged creature is the fourth and last step in the development of the insect, and the caterpillar is the second, for it is the larva, or worm, that hatches from the egg. A study of the origin of the word *caterpillar* shows that it means, literally, *hairy cat*. Everyone is familiar with the woolly kinds, and the name, so far as they are concerned, is not inappropriate. There are, however, hairless kinds, the skin of which is often beautifully marked lengthwise or crosswise, or covered with rings and eye-spots.

When the tiny caterpillar first emerges from the egg it proceeds to eat, for this is to be its chief duty during the larva stage. The eggs are always deposited where plant food can easily be reached. Before very long the skin of the worm becomes too tight, for it does not increase as the body grows larger.

Accordingly the caterpillar soon crawls out through a split which occurs near the front end; that is, it *molts* (see *MOLTING*). This process is repeated four or five times, and in each case a new skin has formed under the old one.

The body of a full-grown worm is usually divided into twelve rings or segments, and each of the first three rings bears a pair of five-jointed legs. There are also short leg-stumps on the abdomen, which disappear when the last molting takes place. On each side of the head there are six eye-spots; the head also bears a pair of short, three-jointed feelers, besides jaws and other mouth organs. Glands, some with unpleasantly odorous or stinging secretions, frequently occur on the skin.

There comes a time when the caterpillar ceases to eat and begins to prepare for the so-called *pupal*, or resting, stage. The caterpillar stage lasts two or three months in temperate regions, but it may be of two or three years' duration in Arctic lands. The quantity of food eaten is used to nourish the *pupa*. Moth caterpillars spin a casing of silk about them, and form *cocoons*, while the pupal stage of butterflies is passed in a hard skin covering. Butterfly pupae are called *chrysalids*. When the pupa reaches maturity the outside casing splits open, and the butterfly comes out, rather crumpled and weak at first, but soon ready to spread its wings for a happy life in the sunshine. The same processes of development occur in the life history of moths.

CAT'FISH, a large family of fishes inhabiting both fresh and salt water. All species are characterized by their smooth skin and the sharp spines, or thorns, at each side of the head, which, when the fish is frightened or attacked, are erected at right angles to the body. Their name refers to their habit of making a peculiar purring sound when taken out of the water. The fresh-water species in North America are often known as *horned pout* and *bullhead*. The largest of these species, the Mississippi catfish or bullhead, is abundant in the lower Mississippi and its tributaries. Specimens weighing 150 pounds have been taken, but the average weight is about thirty-five pounds. The flesh has a sweet flavor and is highly nutritious.

CAT'GUT, a cord made usually from the intestines of sheep, sometimes from those of the horse, ass and mule, but never from those

of the cat, as might be supposed from the name. The word is believed to be derived from the Greek for *guitar* and to *pour*. The manufacture is chiefly carried on in Italy and France, by a tedious process. Catgut is used in the manufacture of the strings of harps, violins and other musical instruments and various other articles. The best strings are made in Milan and Naples, Italy.

CATHARINE I (?-1727), empress of Russia. She was the daughter of poor parents, who died when she was three years old. In 1701 she married a dragoon of the garrison of Marienburg, and when the town was taken by the Russians in 1702, she was sent with others to Moscow, where she first saw Peter the Great. She acquired a great influence over him, and in 1712 he married her. In 1724 she was crowned at Moscow, and on her husband's death she became sole ruler. She lived only a few months after her accession.

CATHARINE II (1729-1796), empress of Russia, called CATHARINE THE GREAT. In 1745 she was married to Peter, nephew of the Empress Elizabeth. Peter came to the throne on the death of Elizabeth in 1762, but Catharine, with the assistance of her lover, Gregory Orloff, and others, won over the guards, and after Peter had reigned for a few months he was deposed, thrown into prison and afterward killed, while Catharine was proclaimed empress.

On the death of Augustus III of Poland she caused one of her favorites to be placed on the throne, and by this she profited in successive partitions of that country. By the war with the Turks, which occupied a considerable part of her reign, she conquered the Crimea and opened the Black Sea to the Russian navy. Her dream, however, of driving the Turks from Europe and restoring the Byzantine Empire was not to be fulfilled. She improved the administration of justice, ameliorated the condition of the serfs, constructed canals, founded the Russian Academy and in a variety of ways contributed to the enlightenment and prosperity of the country. Her enthusiasm for reform, however, was summarily checked by the events of the French Revolution, and the dissipation and extravagance of her court were a severe blot on her reign.

CATHARINE DE' MEDICI (1519-1589), the wife of Henry II of France, and the daughter of Lorenzo de' Medici. She married

the Duke of Orleans, afterward Henry II, and was the mother of four sons, three of whom became kings of France. During the reign of her eldest son, Francis, she began to be prominent in state affairs, and after his death, during her regency for Charles IX, the government was entirely in her hands. Her policy was to keep the two great parties of the Houses of Guise and Condé fighting against each other, taking care that neither should obtain the balance of power. Finally, finding that the House of Condé under the leadership of Admiral Coligny was becoming too strong, she entered into a plot with the Guises which resulted in the massacre of Saint Bartholomew's Day. See BARTHOLOMEW'S DAY, SAINT.

CATHARINE OF ARAGON (1485-1536), queen of England, the youngest daughter of Ferdinand of Aragon and Isabella of Castile, and the first wife of Henry VIII. In 1501 she was married to Arthur, Prince of Wales, son of Henry VII. Her husband died about five months after the marriage, and Henry VII, unwilling to return her dowry, caused her to be married to his remaining son, Henry, procuring a dispensation from the Pope for that purpose. On the accession of Henry to the throne as Henry VIII in 1509, she was crowned with him, and despite the inequality of their ages retained her ascendancy with him for nearly twenty years. When Henry became infatuated with Anne Boleyn, Catharine was divorced, and out of this situation came the separation of the Church of England from the Church of Rome. Mary, the only child of Henry and Catharine who survived infancy, became queen of England in 1553. See HENRY VIII.

CATHAY, *kath ay'*, the name applied to China by Marco Polo, the first European to explore that country. He probably derived it from *Khitah*, the name of a northern tribe which had nearly become extinct. The modern Russian name for China is *Khitai*, but Cathay is now used only as a poetical name.

CATHEDRAL, *ka the'dral*, a church of a special character. That which distinguishes a cathedral from other churches is not the feature that is most popularly associated with it—nobility of architecture—but the fact that it is the principal church of a diocese, possessing the chair of a bishop. The name itself is derived from *cathedra*, which means *seat*. Therefore a small, un-

pretentious building could very well be the cathedral church of a diocese, though this is not often the case. In fact, there are so many cathedrals of impressive beauty that the name is very definitely connected with the highest achievements in the art of building. Cathedrals naturally vary much, both in style and plan. Those in France and England are mainly in the Gothic style and cross-shaped in plan, often with a chapter house, side chapels, cloisters and crypt. Modified Gothic has been employed in most modern cathedrals, though other styles of architecture have been freely employed.

Noteworthy cathedrals of varying styles are St. Peter's, Rome, and those of Milan and Florence, in Italy; Notre Dame, Paris, and those of Chartres, Amiens, in France; Cologne, Germany; Saint Paul's, London, and those of Canterbury, Wells and York in England. Many beautiful edifices of this character have been built in America, notably Saint Patrick's (Roman Catholic) and the Cathedral of St. John the Divine (Episcopal) in New York; Notre Dame Cathedral in Montreal, Canada. (See ARCHITECTURE).

CATHER, WILLA SIBERT (1876-), American novelist, was born in Winchester, Va., but when a child went with her parents to Nebraska, where she passed her formative years. She attended the University of Nebraska, and there began her literary efforts. She went to Pittsburgh, Pa., where she taught school, wrote verse and dramatic criticism. For four years she was managing editor of *McClure's Magazine*. In 1922 her novel *One of Ours* won the Pulitzer Prize, and this was the beginning of a series of popular novels that added to her fame. Among her books are: *A Lost Lady*; *The Bohemian Girl*; *Alexander's Bridge*; *O Pioneers*; *The Song of the Lark*; *My Antonia*; *The Professor's House*; *Death Comes to the Archbishop*; *Shadows on the Rock*.

CATHODE, *kath' ode*, **RAYS**, rays thrown off by the cathode, or negative electrode, in a vacuum. The simplest apparatus for studying cathode rays consists of a cylindrical glass tube exhausted to an extremely high degree and having a platinum electrode sealed in each end. One electrode is in the form of a flat plate. If the electrodes are connected so that the flat plate is given a negative charge with an induction coil or an electric machine, the glass op-

posite the plate glows with pale green light. This glow occurs where the invisible cathode rays strike the glass. These rays pass out in straight lines perpendicular to the surface of the electrode. They are deflected by a magnet or a charged plate as if they were negative particles of electricity. Objects which they strike become negatively charged. They are therefore believed by scientists to be streams of electrons shot out at extremely high speeds. Roentgen or X-rays are given off by the materials which are bombarded with cathode rays. See CROOKE'S TUBES; ELECTRICITY, subhead *The Electron Theory*; ROENTGEN RAYS.

CATHOLIC CHURCH, a phrase equivalent to *universal church*. It was first employed to distinguish the Christian from the Jewish Church, the latter being restricted to a single nation, while the former was intended for the world in general. The name has been retained by the Church of Rome, which was the successor of the primitive church. To the adherents of this faith, the name is peculiarly significant of the characteristics of the Church—unity, visibility, indefectibility, succession, universality and sanctity. The expression is often qualified, especially by those not in the Church, by prefixing the word *Roman*. The Episcopalians claim for themselves the title *Catholic*.

Related Articles. Consult the following titles for additional information:

Creed	Religion
Pope	Roman Catholic Church

CATHOLIC UNIVERSITY OF AMERICA, a university at Washington, D. C., under the auspices of the Roman Catholic Church in the United States. It was incorporated and received its constitution from Pope Leo XIII, and was opened for instruction in 1889. The courses of study are intended primarily to give professional training, and to offer to graduates of Roman Catholic seminaries and colleges facilities for original research. The faculty numbers more than 145; the enrollment is about 1,400. Cardinal Gibbons was chancellor from its foundation until his death in 1921; its early success was due to his efforts.

CATILINE, *kat'iline* (108-62 B. C.), a Roman conspirator of patrician rank, whose plots against the republic called forth a series of brilliant orations by Cicero. His name in full was LUCIUS SERGIUS CATILINA. In his youth he attached himself to the party of Sulla, but his physical strength,

passionate nature and unscrupulous daring soon gained him an independent reputation. He was elected praetor in 68 B. C. and governor of Africa in 67. In 66 he returned to Rome to contest the consulship, but was disqualified by an impeachment for maladministration in his province. He was deeply in debt, and, urged on by his necessities as well as his ambition, he entered into a conspiracy with other disaffected nobles. The plot, however, was revealed to Cicero, and measures were at once taken to defeat it. Thwarted by Cicero at every turn and driven from the senate, Catiline fled and put himself at the head of a large but ill-armed following. The news of the suppression of the conspiracy and the execution of the ring-leaders at Rome diminished his forces, and he led the rest toward Gaul. A Roman force surrounded the rebels and, driven to bay, Catiline turned upon the enclosing army and died fighting.

CAT'KIN, the common name of a class of flowers borne by the birches, alders, willows and other trees. A catkin consists of a cluster of one-sex flowers without petals, protection being afforded by modified leaves, or bracts. The name refers to the general appearance of the flower cluster, which resembles the tail of a cat, but the botanical term for these flowers is *ament*. The catkins of the pussy willow, poplar and chestnut are among the most attractive of the group.

CAT'NIP, or **CAT'MINT**, a plant of the mint family, widely diffused throughout North America and Europe. It grows erect to a height of two or three feet, has whorls of rose-tinged, whitish flowers, and stalked, downy, heart-shaped leaves. It has much the same fascination for cats as valerian root. In some sections a tea brewed from the leaves is used as a home remedy for colic and as a tonic.

CATO, **MARCUS PORCIUS** (95-46 B. C.), a Roman soldier and statesman, called Cato of Utica, from the place of his death, to distinguish him from the censor, his great-grandfather. He earned a reputation as a volunteer in the war against Spartacus, served as military tribune in Macedonia and was made quaestor in 65 B. C. His rigorous reforms won him general respect, and in 63 B. C. he was chosen tribune of the people. During the troubles with Catiline, Cato gave Cicero important aid, and at the same time he prepared to thwart the ambitious proj-

ects of Pompey, Caesar and Crassus. To get rid of him, they sent him to take possession of Cyprus, but after successfully accomplishing his mission, he returned, opposed the law for conferring extraordinary powers on the triumvirs, and in 54 B. C. enforced a law against bribery. On the breach between Pompey and Caesar, he joined Pompey. After receiving news of Pompey's defeat at Pharsalia, he sailed to Cyrene and effected a junction with Metellus Scipio at Utica. He took command of that city, but, its defense appearing hopeless after the defeat of Scipio, he stabbed himself with his sword.

CATO, **MARCUS PORCIUS**, surnamed **PRISCUS**, **THE ELDER**, and **SAPIENS**, **THE WISE** (234-149 B. C.), was a celebrated Roman statesman, and the first important writer of Latin prose. He inherited from his father, a plebeian, a small estate in the territory of the Sabines and spent the early years of his manhood in its cultivation. At the age of seventeen, he served his first campaign under Fabius Maximus in the Second Punic War, was present at the siege of Capua and in 207 B. C. fought at the siege at Tarentum. After the war was ended he returned to his farm, but later, by the advice of Valerius Flaccus, removed to Rome, where his oratorical abilities had free scope. He rose rapidly in rank accompanied Scipio to Sicily as quaestor, became an aedile and in 198 was chosen praetor and appointed to the province of Sardinia. Three years later he gained the consulship, and in 194 for his brilliant campaign in Spain obtained the honor of a triumph. In 191 he served as military tribune against Antiochus and then returned to Rome.

For several years Cato exercised a practical censorship, scrutinizing the characters of candidates for office and denouncing false claims and speculations. His election to the censorship in 184 set an official seal to his efforts, the unsparing severity of which made his name proverbial, and gave our language the word *ensorious*. In 157 he was sent to Carthage on diplomatic business, and so impressed was he by the strength of the city that he warned his countrymen repeatedly of the danger of so powerful a rival. From that time on every speech he made in the senate ended with the now historic phrase, "Carthage must be destroyed."

CAT'S-EYE, a variety of quartz, very hard and semitransparent, and from certain

points exhibiting a yellow internal radiation resembling a cat's eye. It is found in Ceylon and Malabar, and when cut and polished forms a gem of considerable value.

CATSKILL MOUNTAINS, a beautiful range of mountains in New York state. They lie on the west side of, and nearly parallel to, the Hudson, from which their base is, at the nearest point, eight miles distant. Their length is fifty miles and their width thirty miles. The two highest peaks are Slide Mountain, 4,250 feet, and Hunter Mountain, 4,025 feet. The Dunderberg, another peak, is the scene of Washington Irving's *Rip Van Winkle*. The Catskills are visited by tourists, and on their slopes are numerous resorts. The Catskill Aqueduct, which partly supplies New York City with water, begins in these mountains.

CAT'SUP. See KETCHUP.

CATT, **CARRIE CHAPMAN** (1859—), an American suffragist, born in Ripon, Wis. After her graduation from the State Industrial College of Iowa she took a course in law, then entered the teacher's profession, becoming a public school superintendent at Mason City, Iowa. In 1890 she married George William Catt (died 1905), and about this time began active work for the woman suffrage cause. She served as president of the national association in America and also of the International Woman Suffrage Alliance, and has lectured in behalf of political equality throughout Europe and America. Mrs. Catt was a leader in the campaign for the adoption of the Susan B. Anthony suffrage amendment which passed the national House of Representatives in January, 1918. In March, 1919, she was elected temporary chairman of the newly-organized League of Woman Voters, which held its first convention in Saint Louis.

CAT-TAIL, a family of marsh plants whose most prominent feature is the cylindrical spike of dark-brown flowers at the top of the stem. The leaves are long, slender and waving, and altogether these plants have a very attractive appearance. There are two American species, the larger of which is often called *bulrush*. It grows to a height of five feet or more. The smooth, handsome flower heads of the cat-tail are used for decorations, and as the pollen is inflammable, children sometimes soak the plant in kerosene and use it as a torch. In some countries the young shoots are eaten as a vegetable, and in

the United States the leaves are occasionally used by coopers, who place them between the staves and in the seams of barrel heads.

CAT'TEGAT, or **KAT'TEGAT**, a large gulf of the North Sea, between Denmark and Sweden. It is about 150 miles long and ninety miles wide, and forms a connecting link between the North and the Baltic seas. On account of its many shoals and its frequent storms, it is dangerous for navigation. The Cattegat is noted for its herring fisheries. The name is the Scandinavian word for *cat's throat*.



CATTLE, *kat'l*, a group of cud-chewing mammals which are among the most valuable of all domesticated animals. The term has had a wide application, but is usually restricted to animals of the ox family—oxen, cows and steers. Cattle are utilized as beasts of burden, but they are principally valuable in providing mankind with food and leather, the latter made from their hides. Their food products are milk and meat, and the great importance of these products has led to the breeding of two types of cattle, the *beef* and the *dairy* groups.

Beef Cattle. Cattle of this type are closely built, with small bones evenly covered with flesh. The chief breeds are as follows:

(1) *Shorthorns* (also called *Durhams*), originating in the English counties of Durham and York. They are red; white and red; pure white, or roan. Their horns, which are short and blunt, and about twelve inches long, stick out straight from the sides of the head. Shorthorns outnumber all other beef breeds.

(2) *Herefords*, originating in County Hereford, in the southwestern part of England. These cattle are red, with white face and breast, white legs below the knees, and white on the top of the neck and along the base of the abdomen. They have horns like those of the Shorthorns.

(3) *Aberdeen-Angus*, a breed of black cattle originating in Scotland. They are hornless, and have short legs, short, wide head and short neck.

(4) *Galloways*, a breed of medium-size, hornless cattle originating in Southwestern Scotland. They resemble the Aberdeen-Angus, but are especially characterized by their long hair.

Dairy Cattle. Cattle bred chiefly for milk are much more loosely built than beef cattle. The joints are prominent, and there is no superfluous flesh. The hips and pelvic region are higher than the shoulders, and the abdomen and udders enlarged. The principal breeds are as follows:

(1) *Holstein-Friesian*, a breed originating in Holland. These cattle are black and white, and have small horns curved inward and upward. They are the largest of the dairy breeds, and give the most milk, though it is not the best in quality. The Holstein-Friesian breed has been developed most extensively in the United States.

(2) *Guernsey* and *Jersey*, bred on the Channel islands of the same names. There milk is noted for its high percentage of butter fat. Jersey cows are of a fawn color, varying from light to dark and with or without white patches. Guernseys are larger and more loosely built than Jerseys, and are yellowish, reddish fawn or brownish. White markings often occur. Both breeds have short, curving horns.

(3) *Ayrshire*, originating in County Ayr, Scotland, about the size of the Jersey breed but more compactly built. The typical color is red and white, the horns are long and upward curving. Ayrshires produce milk of excellent quality.

Related Articles. Consult the following titles for additional information:

Beef	Meat
Domestic Science	Milk
Food	Meat Packing

CAUCASIAN, *kaw ka'shan*, **RACE.** See RACES OF MEN.

CAUCASUS, *kaw'ka sus*, a range of mountains extending from the Black to the Caspian Sea and forming one of the natural barriers between Europe and Asia. The length of the main range is 940 miles, and the width of the system varies from 30 to 130 miles. The greatest height is attained in the center, where there are said to be more than twenty peaks exceeding Mont Blanc in altitude. Of these Elburz, 18,470 feet, is the highest. The lower slopes are covered with dense forests, mostly of evergreen, and the scenery is grand and gloomy.

These mountains are the dividing line be-

tween former Russian territories, Cis-Caucasia and Trans-Caucasia. In 1920 these became the new republics of Georgia, Armenia and Azerbaijan. The Caucasian territory was overrun by the Turks during the World War.

CAUCUS, *kaw'kus*, a term applied to a meeting of members of a political party to agree upon candidates for office, or a meeting of members of one political party in a legislative body to propose party measures. Its origin is referred to an affray between some British soldiers and some Boston rope makers in 1770, which resulted in meetings of rope makers and *caulkers*, called by the Tories *caucus* meetings. The species of caucus first named above has gradually changed from an informal gathering to one at which secret votes are cast, as at general elections, under the influence of laws to prevent corruption. The second kind of caucus is still much used in legislative bodies, to determine the policy of the party representatives, and to choose candidates for office in the body. Until 1824 candidates for President and Vice-President were chosen by caucuses of members of Congress.

CAULIFLOWER, *kaw'li flower*, a garden variety of cabbage, in which cultivation has caused the flowers to assume, when young, the form of a compact, fleshy head, or "curd." The curd is the edible part of the vegetable. It has a mild but distinctive flavor when properly cooked and seasoned. It may be creamed, pickled, or boiled and served with butter sauce. Like cabbage, cauliflower is valued for its vitamins and minerals. At the market, the housewife should never accept a curd with soft or dark spots, which indicate staleness.

CAUSTIC, *kaws'tik*, a name given to substances which have the property of burning, corroding or disintegrating animal or vegetable matter. *Lunar caustic* is a name given to nitrate of silver when cast into sticks for the use of surgeons. *Caustic potash* is the hydrate of potassium; *caustic soda*, the hydrate of sodium.

CAVALIERI, *kah vah ly d're*, **LINA** (1874-), an operatic soprano of Italian birth, the wife of the tenor, Lucien Muratore. She was born in Rome, and is accounted one of the most beautiful women on the modern stage. Cavalieri began her artistic career by singing in cafés and concert halls, but was not content to remain in obscurity, and by persevering effort she attained an honored place in

opera. After her initial appearance in grand opera at the Royal Theater in Lisbon (1900), she sang a number of important rôles, including those in *La Bohème*, *La Traviata*, *Rigoletto*, *Mignon* and *Fedora*. In America she has also sung in concert and acted in moving pictures.

CAVALIERS, *kav a leers'*, a name applied in history to the partisans of Charles I of England, as opposed to *Roundheads*, the name given to the adherents of the Parliamentary cause.

CAVALLERIA RUSTICANA, *kah vahl la reé a roo ste kah'nah*, the most successful of the operas composed by Pietro Mascagni, an Italian musician. It is in one act, but there is a short period during which the stage is vacant. At this time the orchestra plays the *Intermezzo*, one of the best loved musical compositions of to-day.

The libretto of the opera, written by two friends of the composer, is based on a story of life in Sicily. Santuzza, the heroine, is a beautiful girl who wins the love of Turiddu after he has been deserted by Lola. The latter had married Alfio, the village carter, while Turiddu was away fighting. Santuzza discovers to her sorrow that Turiddu is again coming under the fascination of his former sweetheart, and despairingly tells Alfio of the situation. Turiddu is then challenged to a duel with knives and killed. The opera has been unceasingly popular since its first presentation at Rome, in 1890. It is full of spirited and dramatic action, and the music is very melodious.

CAVALRY, a body of troops which serve on horseback; one of the three great classes of troops, and a formidable power when possible to employ it in offensive operations (it is not a defensive machine). Until the methods of warfare changed with the introduction of new devices and almost an entirely new strategy to meet new conditions, cavalry was one of the most dependable arms of military power. Under traditional methods of warfare as practiced until recently, it has been adapted since ancient times to speedy movement, which enabled a commander to avail himself of a decisive moment and strike quickly whatever weak point an enemy exposed. It was serviceable, too, in protecting the wings and center of an army of infantry; for intercepting the supplies of an enemy; for procuring intelligence; for covering a retreat, and for foraging.

The World War (1914-1918) developed methods of attack and defense hitherto not practiced, due to the increasing superiority of mechanical devices—airplanes, armored tanks, and guns of astonishing range, for example—and cavalry maneuvers were made difficult; then when trench warfare largely succeeded open combat, cavalry became almost useless. Military authorities are in agreement that in modern warfare old-time cavalry squadrons must be abandoned in large degree in favor of mechanized mobile units. This movement is proceeding at a rapid pace in strong military countries, and is destined to become universal.

CAVE, or **CAVERN**, an opening of some size in the solid crust of the earth beneath the surface. Caves are principally met with in limestone rocks, but sometimes in sandstone and in volcanic rocks. Some have been formed by the upheaval of the earth's crust, which caused some strata to slide over others in such a way as to leave caverns beneath. The size of these caverns may have been increased by the action of water. The caves in volcanic regions were undoubtedly formed while the lava was in a plastic state; and they are supposed to be due to the expansion of gas, which formed caverns in the rock in a manner similar to that in which pores are formed in bread while baking. But water is the most important agency in the formation of caves, and most of the large caverns have been formed by its action. Caverns of this nature are generally found in limestone regions.

Some caves are of great extent, such as Mammoth Cave, in Kentucky, which has more than 150 miles of passageways. Others are remarkable for their depth. The most noted of these is the Frederikshall, in Norway. The Wyandotte Cave, in Crawford County, Ind., and the Luray Caverns, in Page County, Va., are celebrated for their beautiful stalactites and stalagmites. Carlsbad Cavern, in Southeastern New Mexico, recently explored, extends several miles through halls and chambers of great magnificence.

Many caves contain the remains of animals, some of which are extinct, and some of which show that the animals living in the region at the time were similar to those now found in different parts of the world. Examples are the remains of the reindeer and hyena, which are found in some caves in Southern Europe. The reindeer now lives

only in the high latitudes, and the hyena is found in South Africa. In some of these caves human bones are found intermingled with those of the animals, as are pieces of charcoal and rude implements, showing that men lived upon the earth at the same time as the animals whose skeletons are found.

Related Articles. Consult the following titles for additional information:

Fingal's Cave
Luray Caverns

Mammoth Cave
Wyandotte Cave

CAVEAT, *ka've at*, a formal notice addressed to a judicial or administrative officer, warning him not to take certain proceedings, without first giving due notice to the person filing the caveat. The object is to secure an opportunity to be heard in opposition to the action or proceeding in question. In the United States, the caveat is most frequently employed to stay the probate of wills of deceased persons.

CAVE DWELLERS, the name applied to the inhabitants of caves in the early stages of human civilization. Just when primitive man first sought the protection of a cave will never be known. Probably he first found it a temporary refuge from great beasts he was unable to subdue with the crude weapons he possessed. The cave soon came to serve as a dwelling-place; it protected him from danger and from cold. But cave dwellers belong to no one period of human history; while they date back many thousands of years in the misty past, it is known that they existed in some parts of the earth well into the historic period. Some of them were endowed with artistic ability of low degree; on their cave walls they left rude drawings of animals of their period. The most numerous evidences of cave people are found in England, France, Germany, and Switzerland. The homes of the cave men show the slow advance in civilization from the period of weapons and utensils of bone to those of stone, marking the Stone Age, into the later more enlightened ages of Copper, Bronze, and Iron.

There was a race which we have termed Cliff-Dwellers, in Arizona and New Mexico, who lived so long ago that we have no knowledge of them save in the remains of their very remarkable habitations. They are not to be directly associated with the Cave Dwellers, for they lived in a more recent period and attained higher civilization. See **CLIFF DWELLERS**.

CAVIAR, *kav'e ahr*, or *ka vyahr'*, or **CAVIARE**, a food prepared from the roe of the sturgeon. Caviar is made by freeing the eggs from the tissue which holds them together, then washing them and rubbing them with salt, after which they are dried and packed in kegs. It is considered a great delicacy, especially among the Russians, in whose country it is manufactured in large quantities. The abundance of sturgeon in the Great Lakes has given rise to the manufacture of caviar in some parts of the United States, and Canada.

It is not a general article of diet because of its high cost; the piquant flavor is agreeable only to a cultivated taste. A reference to this delicacy occurs in Shakespeare's *Hamlet*, in which a certain play is said to be "caviar to the general."

CAVOUR, *ka'voor'*, **COUNT CAMILLO BENSO DI** (1810-1861), a distinguished Italian statesman, one of the makers of United Italy. From his earliest entry into political affairs his chief aim was to unite Italy under a central government, which should be independent of Austria. He became a member of the Sardinian Parliament in 1848, and two years later, minister of commerce and agriculture.

In 1852 he became premier, and not long afterward he took an active part in cementing an alliance with Great Britain and France, and making common cause with these powers against Russia during the Crimean War. When the war closed, Cavour was appointed a delegate to the Peace Congress, where he succeeded in winning for his state the recognition of the European powers. He next made preparations for war with Austria, obtained the aid of France, and in 1858, by his hostile attitude, forced Austria to open the struggle. The result was victory for Sardinia, and Cavour was able, with the aid of Garibaldi, to unite all Italy, except Rome and Venice, by the beginning of 1861. He lived to see the meeting of the first Italian Parliament.

CAWNPORE, *kawn'pohr*, **INDIA**, an important military and commercial city on the right bank of the Ganges, 628 miles northwest of Calcutta. During the Sepoy Rebellion in 1857 it was the scene of a mutiny of the native troops, which resulted in the massacre of many men, women and children. The place was relieved by the British under General Havelock, but not in time to pre-

vent the slaughter of the prisoners. A white marble memorial marks the place where 200 bodies were thrown into a well. As the junction point of four important railway systems, Cawnpore has become a trade center of great importance, and it possesses prosperous manufactories of cotton, harness and other goods. Population, 1931, 243,755.

CAXTON, WILLIAM (1422-1491), the man who introduced the art of printing into Great Britain. He served an apprenticeship to Robert Large, a London mercer, and on the latter's death went into business for himself at Bruges. He had translated the popular medieval romance, *Collection of the Histories of Troy*, and in order to multiply copies he learned the newly discovered art of printing. This work was printed either at Cologne or Bruges about 1474, and is the earliest specimen of typography in the English language. In 1477 he published the first book printed in England. Caxton translated twenty-one books, mainly romances, from the French, and one from the Dutch, helping materially to fix the literary language of the sixteenth century. Among his works were the *Game of Chess* and *Dictes and Notable Sayings of the Philosophers*. He was buried in the Church of Saint Margaret's, Westminster.

CAYENNE, *ka en'*, or *kien'*, FRENCH GUIANA, the capital of the colony and a seaport on an island of the same name, at the mouth of the Cayenne River. The harbor is large, but shallow, and the port sends out all products exported from the colony. The city has been in French possession since 1675. Population, 1931, 10,350, about half that of the colony.

CAYUGA, *ka yoo'gah*, an Indian tribe formerly dwelling on the shores of Cayuga Lake, New York. These Indians belonged to the original Iroquois confederacy, and were called the *Youngest Brother*, because they were the last to join it. They were the smallest tribe of the union. At the outbreak of the Revolution they joined cause with the British and removed to Canada. Of the remnant still surviving, the majority live on the Six Nations Reserve in Ontario. A few are scattered among the Oneidas and Senecas in the United States. See FIVE NATIONS, THE.

CAYUGA, *ka yu'gah*, **LAKE**, a beautiful lake, situated west of the center of the state of New York. It is thirty-eight miles long

and from one to three and one-half miles wide, and it discharges its waters into Lake Ontario, through the Seneca and Oswego rivers. The principal towns on its banks are Cayuga, Ithaca, seat of Cornell University, and Aurora. This lake is one of the group known as the Finger Lakes.

CEBU, *se boo'*, or **ZEBU**, one of the Philippine Islands, lying between Luzon and Mindanao. It is 130 miles long and twenty miles wide, and has an area of 1,782 square miles. Sugar, hemp, cotton and rice cultivation, fishing and the manufacture of native wine, refined sugar, cloth and pottery are the chief industries. The town of Cebu, the capital, on the eastern coast of the island, the oldest Spanish settlement in the Philippines, is a place of considerable trade and has a cathedral and several churches. The island was first occupied by the United States in February, 1899, and was given civil government as a province in 1901. Population of the island, about 600,000.

CECIL, *ses'il* WILLIAM, Lord Burleigh (1520-1598), an English statesman. He was secretary of state under Edward VI, and although as a Protestant he resigned his position on the accession of Mary, he entirely escaped persecution, though he never denied his Protestant tendencies. When Elizabeth came to the throne she chose Burleigh as her secretary of state, and this office he held until his death. The glory of the reign is due to him, as the real director of the policy, more than to any other man.

CECILIA, *se sil'yah*, SAINT, the patron saint of music, falsely regarded as the inventor of the organ. She is said to have suffered martyrdom A. D. 230, although other dates are given. In the Roman Catholic Church, her festival (November 22) is celebrated with beautiful music. Her story forms one of Chaucer's *Canterbury Tales*, and Dryden, in his *Alexander's Feast*, and Pope, in his *Ode on Saint Cecilia's Day*, have sung her praises. Raphael, Domenichino, Dolce and Mignard have represented her in celebrated paintings.

CECROPIA, a genus of beautiful South American trees, of the breadfruit order. One of these, the *trumpet-wood*, is remarkable for its hollow stem and branches, which the Indians make into drums and wind instruments. The light, porous wood is also used by them for making fire, which they accomplish by rubbing it against a harder

wood. The inner bark is fibrous and strong and is used for cordage.

CECROPS, *se'krops*, in Greek legend, the first king of Attica. The famous citadel of Athens, called Cecropia in his honor, was said to have been built by him, and tradition also credited him with the founding of Athens. Asked to decide who should have the honor of naming the city, Athena or Poseidon, he gave the honor to the goddess, whose name was thus perpetuated in Athens.

CEDAR, *se'dahr*, the name of several species of evergreen trees belonging to the pine family. Cedars are distinguished by their horizontal, wide-spreading branches, their fine, compact leaves and their reddish wood, which is fragrant and very durable. The famous cedars of Lebanon, so frequently mentioned in the Bible, belong to the most widely known species. Of these trees comparatively few now remain, and they do not grow in any other part of Palestine. The most celebrated group is situated not far from the village of Tripoli, at an elevation of about 6,000 feet above the sea. The circumference of the largest trees varies from about eighteen to forty-seven feet. The term is also applied to the deodar, a somewhat similar tree, which is a native of India and often attains a height of 150 feet.

The white cedar is common from Quebec to Mississippi. It is distinguished by its flat, scalelike leaves and branches, extending horizontally or slanting downward, and its fragrant odor, due to its balsam. The tree often attains a height of eighty to ninety feet, but seldom exceeds two feet in diameter. The timber is valuable for cooperage, fence posts and the manufacture of chests for storing furs and other articles which it is desired to protect from insects, since this wood is poisonous to them. The twigs are used in the manufacture of cedar oil.

The *red cedar* is found in the swamps of Florida and in other localities in that vicinity. The wood is reddish or yellowish-red and is very durable, especially for uses where it comes in contact with water. Because of the value of its timber this tree has been nearly exterminated in some places. A variety of red cedar, known as the *Bermuda cedar* and found in the West Indies, is extensively used for making the cases of lead pencils.

CEDAR CREEK, BATTLE OF, the last battle of Sheridan's campaign in the Shenan-

doah Valley, in 1864, fought on October 19. During the early part of the battle Sheridan was absent, having been called to Washington, and the Federals were commanded by General Wright. They were attacked at daybreak by the Confederates, who completely routed a large part of the Union force. With some difficulty Wright reformed his line, though suffering heavy loss. At this time General Sheridan, who had learned of the battle while at Winchester, twenty miles away, met the disheartened Federals, inspired them with new enthusiasm and led an attack which put the Confederates to flight with great loss. Sheridan's exploit inspired Read's famous poem, *Sheridan's Ride*.

CEDAR MOUNTAIN, BATTLE OF, a battle of the Civil War, fought near Culpeper Court House, Va., August 9, 1862, between a Union force of 8,000 under General Banks and a Confederate force of 24,000 under "Stonewall" Jackson. Banks had come upon the rear guard of Jackson's army and attacked it vigorously. Jackson rallied his men and drove back the Union force. The Confederates lost 1,300, the Federals, 1,800.

CEDAR RAPIDS, Iowa, founded in 1845 and incorporated in 1856, is in Linn County, about eighty miles southwest of Dubuque, on Cedar River, not navigable, and the Chicago & North Western, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee, Saint Paul & Pacific, and the Illinois Central railroads. There are four railroad bridges over the river. The city has a number of wholesale houses, four libraries, a museum, a Federal building and a Memorial Building. The industries include a wide range of activity; principal among them are railroad shops, pork packing establishments, cereal mills and a starch factory. Rapids in the river furnish water power. Coe College (Presbyterian) is located here. The commission form of government has been adopted, with a mayor and four commissioners. Population, 1930, 56,097.

CELEBES, *se'le bees*, one of the larger islands of the Dutch East Indies, between Borneo on the west and the Moluccas on the east. The area is about 72,000 square miles. Gold is found in all the valleys of the north peninsula, which abounds, also, in sulphur and copper. Tin occurs at various points. Diamonds and other precious stones are found. The chief cultivated products are tropical fruits, spices, corn, rice, tobacco,

indigo and sugar. The trade in trepang (which see) is very important.

The inhabitants may be classed into two groups, the Mohammedan semicivilized tribes and the pagans, who are more or less savage. The capital is Macassar, in the southwestern part of the island, and through this port most of the trade of the island passes. In 1660 Macassar was taken by the Dutch, the southern portion of the island was put under Dutch rule and the Portuguese were expelled. The island was conquered by the British in 1811, but a few years later it was again given up to the Dutch, in whose possession it has remained ever since. Population, 1920 census, 3,108,337.

CELERY, *se'leri*, a plant of the parsley family, native to the temperate parts of Europe, but extensively cultivated in North America, where it is highly popular as a salad vegetable. In its natural state it is bitter and tough, but the crisp, tender stalks of the cultivated varieties have a delightful flavor. Celery is grown from seed, which is placed in a hothead for an early crop, and in the open for a late crop. If the plants are desired for summer or fall use, boards are placed about the stalks to shut out the light. By this means the coloring matter in the tissues is destroyed and the stalks are whitened, or *blanched* (see *ETOLATION*). Celery grown for winter use is blanched by having earth heaped up about the stalks. On the approach of winter the plants are taken up and set in pits or in a cool cellar. Moist earth is packed around the roots and the blanching process continues. Another method consists in making rows from six to twelve inches apart, whereby the plants are self-blanched, only the outside rows needing artificial darkening.

Celery needs moisture and a fertile soil. It is grown extensively in Michigan, California, New York, Florida and in Ontario. The center of the industry in Michigan is in the vicinity of Kalamazoo.

CELESTINE, *se'les tin*, the name of five Popes, of whom two were of special note.

Celestine III occupied the Papal chair from 1191 to 1198. He was eighty-five when elected, and his short reign was troubled. He excommunicated Henry VI of Germany for seizing Richard the Lion-Heart while the latter was on his way home from the Crusades, and he endeavored unsuccessfully to bring John of England to terms for his rebellious behavior. In 1192 Celestine confirmed the statutes of the Teutonic Order of Knights.

Celestine V. Pope from August to December, 1294. He had been a Benedictine monk and was noted for the severity of the discipline he exacted of himself. During his brief tenancy of the high office he issued two decrees, one of which confirmed the decree of Gregory X that the cardinals when in conclave should be kept in confinement. The other decree affirmed the right of the Pope to abdicate. He himself acted upon this right after ruling a little over five months. His successor, Boniface VIII, had him imprisoned because he feared he might become the leader of a new party. Celestine died in May, 1296. He was canonized in 1313.

CELIBACY, *sel'i ba si*, the state of being unmarried; especially applied to the voluntary life without marriage followed by many religious devotees and by some orders of clergy, as those of the Roman Catholic Church. The ancient Egyptian priests, the priestesses of ancient Greece and Rome and the Buddhist priests of the East made celibacy a rule of life. Among the Christians the earliest aspirants to the spiritual perfection supposed to be attainable through celibacy were not ecclesiastics, as such, but hermits and anchorites.

CELL, *sel*, in biology, the unit of structure of plants and animals. It is a microscopic, semifluid portion of matter, surrounded by a cell wall, and consists of a soft mass of living, jellylike matter called *protoplasm*, and a central structure, or organ. The latter, called the nucleus, is a small roundish body generally more solid than the rest, sometimes having within it a still smaller body called the *nucleolus*. The simplest plants and animals have but one cell, while the more complex have masses of many cells. Cells are nearly spherical in outline, but if pressure is exerted upon them by the other cells, they may take on various modified forms, becoming regularly polygonal, spindle-shaped, cylindrical or star-shaped. The cell substance, or protoplasm, which surrounds the nucleus, is an albuminous substance possessing fundamental vital properties. It is organized into various structures called the *organs* of the cell, each organ having one or more special functions. The nucleus governs the process of reproduction.

The cell multiplies by the division of the whole cell into two cells. This process begins at the nucleus. When the cell reaches a certain size, its nucleus divides along a definite line, and the two parts grow to the size of the first and repeat the process. See **PROTOPLASM**.

CELLINI, *chelle'ne*, BENVENUTO (1500-1571), an Italian sculptor, engraver and goldsmith. As the result of a duel he was forced to leave Florence, and afterwards, having gone to Rome, he gained the patronage of Pope Clement VII. Cellini's quick temper and quarrelsome disposition led him into frequent brawls, and he stayed in few places for any length of time. At the court of Francis I of France he modeled the *Nymph of Fontainebleau*, an excellent example of his work. He afterward returned to Florence, and under the patronage of Cosimo de' Medici he made a *Perseus with the Head of Medusa* in bronze, which is still an ornament of one of the public squares, and a statue of Christ, in the chapel of the Pitti Palace, besides many excellent dies for coins and medals. Most of his works lack simplicity and abound in details. When Cellini was fifty-eight years old, he began to write an autobiography, in which the traits of his character appeared clearly in his vivid pictures of that period of the Renaissance.

CELLOPHANE, *sel'o fane*, a transparent, thin, tough material, widely used as a protective wrapper for foods, drugs, candy, books, cigars, etc. It is produced by forcing "viscose"—which is cellulose in the plastic and soluble stage—through a long and narrow slit into a setting bath and then through other chemical baths and finally dried. In its final form of a tough, transparent sheet it is again the pure cellulose of the wood fiber from which it was made.

CELLULOID, *sel'u loid*, an artificial substance extensively used as a substitute for ivory, bone, hard rubber and coral, having a close resemblance to these substances in hardness, elasticity and texture. It is composed of cellulose, or vegetable fibrine, reduced by acids to a substance resembling soluble cotton (see GUNCOTTON); camphor is then added, and the compound is molded by heat and pressure to the desired shape. Celluloid is used chiefly for buttons, handles for knives, forks and umbrellas, billiard balls, backs of brushes, piano keys, napkin rings, opera-glass frames, pipestems, films for cameras. Bakelite is supplanting celluloid in many of the above articles.

CELLULOSE, *sel'u lohs*, a compound of carbon, hydrogen and oxygen, which forms the chief part of the cell wall of all vegetable cells. It is the principal constituent of cotton fibers, and is found in abundance in flax

fibers, wood and straw. It is manufactured in large quantities, and when treated by various chemical processes it produces many valuable substances. From the plastic form "viscose" are derived rayon and cellophane. Viscose is also used for water-proofing, textile printing, etc. Collodion, celluloid, and guncotton are products of cellulose.

CELTS, *setls*, the earliest Aryan settlers in Europe, according to the common theory. They appear to have been driven westward by succeeding waves of Teutons, Slavonians and others. Herodotus mentions them as mixing with the Iberians, who dwelt round the River Ebro, in Spain. At the beginning of the historic period they were the predominant race in Britain, Ireland, France, Belgium, Switzerland, North Italy, Spain and elsewhere. The Romans called them Gauls. They appear to have reached the zenith of their power in the second and third centuries B. C. Some tribes of them, overrunning Greece, settled in a part of Asia Minor, to which the name of Galatia was given. At an early date the Celts divided into two great branches, speaking dialects widely differing from each other, but doubtless belonging to the same stock. One of these branches is the Gaelic, represented by the Highlanders of Scotland, the Celtic Irish and the Manx; the other is the Cymric, represented by the Welsh, the inhabitants of Cornwall and those of Brittany. The sun was the principal object of worship among the Celts.

CEMENTS, *se ments'*, or *sem'ents*, compounds used to stick together other substances. There are many varieties of cement, such as glue, mucilage, paste, mortar and building cements. Building cements are made of certain kinds of limestone containing clay and sand. A small quantity of oxide of lead is added to the mixture. Cements are divided into two classes, *hydraulic* or *water* cements, which will harden under water, and those which will not harden under water.

Portland cement is the most important variety used for building purposes. It is made by two processes, the wet and the dry. In the wet process the clay and limestone are mixed with a large quantity of water in a mechanical mixer. When the mass has been thoroughly mixed, it is emptied into large reservoirs and allowed to settle. In time the heavy material or raw cement settles

to the bottom. The water is drawn off and the raw cement is left to dry in the air until it is a thick paste. It is then placed in the dry-room, where all the moisture is evaporated, when it is burned in a suitable kiln. The kiln is brought to a white heat, and the cement is kept in it until it is almost glass, or until it is nearly vitrified. It is taken from the kiln in the form of clinkers, which are greenish in color. These clinkers are ground to a fine powder between crushing rolls and packed in bags or barrels ready for shipment.

In the dry process the clay and limestone are first separately dried in a dry-kiln, until all the moisture is expelled. The clay and limestone are then mixed and crushed, and the powdered mixture is tempered with water to a stiff paste in a brick-making machine and molded into bricks. The bricks are then burned to the cement clinker in kilns and are finally ground into powder. A natural cement is made from limestone which has the proper ingredients, but it is not as good as the manufactured cement, because the proportions of silica, alumina and iron do not run evenly in the limestone.

Portland cement has been extensively used in making concrete highways. The advantages of this paving are hardness, durability and uniformity of surface. Reinforced concrete building construction calls for immense quantities. There are about 150 establishments in the United States that manufacture cement; the annual output has been valued as high as \$150,000,000. See **ROADS AND STREETS**.

CEMETERY, *sem'e tery* a place of burial.

The colonial custom in the United States was to use the churchyards for burial places, and in some of the older cities, such as Boston, these yards are still seen around the churches, though burial in them has long since ceased. With the increase of population it became evident for sanitary reasons that burial places should be outside of the towns, and the modern cemetery was established. The oldest cemetery in the United States is Mount Auburn, near Boston, famous for its beautiful walks and drives and as the burial place of many eminent Americans. Laurel Hill in Philadelphia, Greenwood on Long Island, Lakeview at Cleveland, Ohio, containing the Garfield Memorial, and Graceland and Rose Hill in Chicago, are among the great cemeteries of the country, noted for their beauty.

There are eighty-three national cemeteries in the United States. These contain the remains of soldiers who were killed or died from disease while in the service of their country. These cemeteries are under the supervision of the quartermaster-general's office of the War Department and are maintained by appropriations made by Congress. The largest is that at Arlington, Va., near Washington. There are six national soldier cemeteries of the United States in Europe; four are in France, one in Belgium, one in England. See **ARLINGTON NATIONAL CEMETERY**; **CATACOMBS**.

Some of the most noted cemeteries in the Old World are the Père Lachaise in Paris, which was the first of modern cemeteries established in Western Europe; Kensal Green, Highgate and Abner Park, London, and the West London Cemetery at Brompton. Burial places cannot be located within towns in England. In Southern Europe catacombs were formerly used.

CENCI, *chen'che*, BEATRICE (1577-1599), an Italian girl, the daughter of Francesco Cenci, a wealthy Roman nobleman. According to an old story, her father treated his family with such brutality that Beatrice, together with her stepmother and brothers, brought about his murder one night at his palace near Naples. Beatrice was imprisoned, with her accomplices, and after a trial was put to death. Shelley's drama, *The Cenci*, is founded upon this story. It is now thought that the beautiful portrait in the Barberini Palace, Rome, known as Guido Reni's *Beatrice Cenci*, is not of Beatrice, nor by Guido Reni.

CENIS, *se nee'*, MONT, a mountain belonging to the Graian Alps, between Savoy and Piedmont, having an altitude of 11,755 feet. It is famous for the winding road, forty miles in length, constructed by Napoleon I from France to Italy, and for an immense railway tunnel.

Mont Cenis Tunnel. This is a railway tunnel through the Mont Cenis Pass, connecting the Italian province of Turin with Savoy, France. It is eight miles long and has two lines of railway. The cross section is twenty-six feet four inches wide in the broadest part and twenty-four feet seven and one-half inches high. The expense of construction was about \$15,000,000. Work was begun in 1857 and the tunnel was completed in 1872. The railway enters the tunnel by means of special

curved sections at each end. The power drill and the air compressor were first used in connection with this work.

CENOZOIC, *se no zo'ik*, **ERA**, the latest general division of geologic time, extending from the Mesozoic Era to the present. The primitive ancestor of man appeared in this era, and all modern forms of plant and animal life developed toward their present character. See GEOLOGY; MESOZOIC ERA.

CENSER, *sen'sur*, a vase or pan in which incense is burned; a vessel for burning and wafting incense. Among the ancient Jews the censer was used to offer perfumes in sacrifices, that for the tabernacle being of brass, that for the temple, of gold. Censers, called also thuribles, of various forms are still used in the Roman Catholic Church at mass, vespers and other offices, as well as in some Anglican and other churches. In Shakespeare's time the term was applied to a bottle perforated and ornamented at the top, used for sprinkling perfume, or to a pan for burning any odoriferous substance.

CENSORS, *sen'sorz*, two officers in ancient Rome, whose business it was to draw up a register of the citizens and the amount of their property, for the purpose of taxation; to keep watch over the morals of the citizens, whereby they had power to censure vice and immorality, and to superintend the finance administration and the keeping up of public buildings. The office was the highest in the State, next to the dictatorship, and was invested with a kind of sacred character. The term is now applied to an officer empowered to examine books and, in some countries, articles for the newspapers, before publication. See CENSORSHIP.

CENSORSHIP, until recent times has included only the official authority to examine written or printed matter to determine whether it is proper to be published and circulated. Within a dozen years there has been added in many communities an official scrutiny of theatrical plays and moving pictures, in the interest of public morals, those which were objectionable being revised or refused permits to exhibit.

Censorship of the press is repugnant to free peoples, except when public security is imperiled. In time of war it might be disastrous to print information as to troop movements, defenses, munitions or even food supplies; patriotic people never complain in

such circumstances. During the World War all mail matter originating in England and France and all matter passing through those countries was subjected to rigid censorship, that no information of value might reach the enemy. This task required the services of thousands of readers and translators. The Central Powers also exercised like supervision of mail matter.

There is censorship of the press in some European countries. In Germany, Russia and Italy, there is absolute censorship under the dictatorships, and partial censorship in a few other countries.

CENSUS, *sen'sus*, an enumeration of the inhabitants of a country, accompanied by such other information regarding them as may be desired. The most complete census reports gathered in the world are those collected by the United States. The first American census, in 1790, reported little else than the number of people in each of the states; gradually it was expanded to vast proportions requiring each time a dozen large, closely-printed volumes to contain the records. Population, agricultural reports, vital statistics, finances of cities, manufactures, mining, and information on lesser matters are a part of each census report. The United States census is taken every tenth year, the latest having occurred in 1930. Many states have separate censuses, taken each time about five years after the national enumeration.

Canada's census, carefully compiled though lacking the completeness of its neighbor's at the south, is also taken every tenth year, the last enumeration having been in 1931. England's last census was in the same year, and it occurs every tenth year. This same policy prevails over all of Western Europe.

South American countries are more lax. Previous to 1900 Bolivia had not had a census since 1854. Brazil, Argentina and Chile, the leading South American nations, are setting a good example to their more backward neighbors; with them decennial censuses are the rule. In Asiatic countries, excepting India, the taking of the census is attended with considerable difficulty, but population reports are fairly accurate.

CENT, *sent*, the name, with variations to fit the different languages employed, of a small coin in various countries, so called because it is equal to a hundredth part of some other coin. In the United States and

in Canada the cent is the hundredth part of a dollar. In France the *centime* is the hundredth part of a franc. Similar coins are the *centavo* of Chile and the *centesimo* of Italy and Peru. Cents or centimes, and their equivalents, are written simply as decimal hundredths of the unit of value. See COINS, VALUE OF FOREIGN.

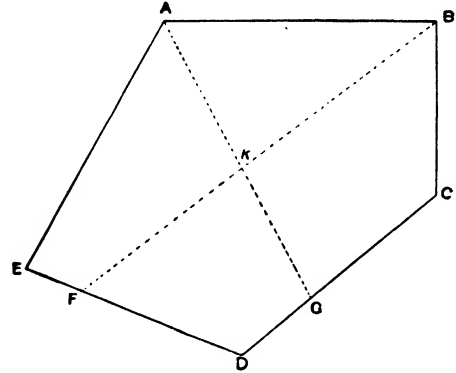
CENTAUR, *sen'tawr*, in Greek mythology, a fabulous being represented as half man, half horse. The centaurs were supposed to dwell in the wilds of Thessaly. The Greeks were fond of portraying in art a legendary battle between the centaurs and the retainers of a certain king whose bride the centaurs attempted to capture. Chiron (which see) was the most famous centaur.

CENTAURUS, *sen taw'us*, a constellation of the southern hemisphere in which occurs Alpha, the third brightest star in the heavens. Astronomers estimate that it takes 4.4 years for the light of this star to reach the earth, and it is therefore the nearest star to the earth. In mythology Centaurus was chief of the centaurs (see CENTAUR) and was accidentally killed by Hercules. Jupiter then placed him among the stars.

CENTENNIAL EXPOSITION, *sen ten'ni al ex po zish'un*, an exhibition of arts, manufactures and products, held at Fairmount Park, Philadelphia, in the summer of 1876, to commemorate the one-hundredth anniversary of the achievement of independence by the United States. It was the first international exhibition held in America. Its site comprised an area of 236 acres, within which about 200 buildings were erected, the largest of which, the main building, was nearly 2,000 feet long and 464 feet wide. Other important buildings were Machinery Hall, Agricultural Hall, Horticultural Hall and Memorial Hall. The last named was constructed of permanent materials and is now used as a museum. Nearly fifty foreign governments were represented in the exhibits, and nearly ten million people were admitted to the grounds, the largest number for a single day being present on Pennsylvania Day (September 28), when 274,919 persons entered the grounds. Special services were held on the opening day, May 10, and on July 4, in honor of the Declaration of Independence. The exhibition was important in that it disclosed to Americans the superiority of some European products, and thus stimulated increased effort for improvement in

American goods; and it also opened the eyes of Europeans to the fact that in the New World a manufacturing and commercial nation was developing which threatened European industrial supremacy.

CENTER OF GRAVITY, that point in a body from which the body can be suspended or poised, theoretically or actually, in equilibrium. It is the exact center of weight of the body.



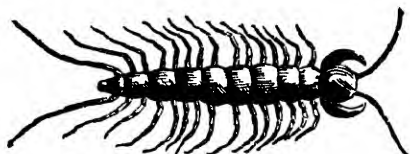
The center of gravity may be found by suspending a body so that it will move freely, first from one point, and then from another, and attaching a plumb line at the point of suspension. The point at which the paths made by the plumb line cross is the center of gravity. In the figure, *ABCDE* represents an irregular body. The center of gravity is found by suspending the body from *A* and marking the path of the plumb line, which takes the direction *AG*, then by suspending it from *B* and marking the path taken by the plumb line, *BF*. *K*, the point of intersection, is the center of gravity. The center of gravity of a circular body, such as a ring, is outside the body.

A pyramid may not easily be tipped over, because its center of gravity is near its base. A load of hay is more easily tipped, for its center of weight is far from its base, the bottom of the wheels of the wagon. See GRAVITATION.

CENTIGRADE SCALE. See THERMOMETER.

CENTIMETER, *sen'ti me t'r*, in the Metric system of measurements, is the hundredth part of a meter. The length of a meter being 39.37+ inches, a centimeter equals slightly less than two-fifths of an inch, or 0.3937 of an inch. The abbreviation for centimeter is *cm*. See METRIC SYSTEM.

CENTIPEDE, *sen'ti peed*, a creature which has many feet and a body consisting of numerous similar rings or segments, each of which bears a pair of legs. The common centipede, found in the United States, is quite harmless, but some species of tropical



CENTIPEDE

countries inflict severe and often dangerous bites. Some of the latter species grow to a length of eighteen inches. They are savage animals and defend themselves energetically. The name means *having a hundred feet*, but in reality no species known has more than thirty-one pairs of legs.

CENTRAL AMERICA, that portion of the North American continent which lies between Mexico, on the north, and Colombia, South America. It contains the republics of Guatemala, Honduras, Salvador, Nicaragua, Costa Rica and Panama and the British colony of British Honduras, or Belize.

Central America covers an area of about 181,150 square miles with a mountainous surface, having volcanoes and many high plateaus. The more important rivers are the Usumacinta, Grijalva, Ulua, Escondido, Wanks and San Juan. There are two large lakes, Nicaragua and Managua. The climate is hot and moist along the coast, but it is dry in the high regions. In the regions along the Atlantic there are luxuriant forests, producing mahogany, logwood, palms and tree ferns. Agriculture is the chief pursuit; the leading products are cocoa, coffee, indigo, mahogany, bananas, and small fruits.

The shores of Central America were first seen by Columbus in 1502. Pedro de Alvarado and Cortez subsequently invaded and conquered much of the territory. Not until the nineteenth century were the present republics established. In spite of frequent political revolutions, their upward progress has been marked.

CENTRIFUGAL, *sen trî'f'u gal*, **FORCE**, the tendency of every moving body to move in a straight line. Whenever a body is compelled to move in a curved path it seems to be pulling away from the center of revolution, and this pull from the center is called

centrifugal force. It is exemplified in the water thrown off from the rim of a wet grindstone when it is turning, and in the mud which flies off from the wheel of a vehicle running on a muddy street. It is centrifugal force also that keeps the water from spilling when a pail of water is rapidly swung over one's head. This force is used to practical advantage in the cream separator.

CENTRIPETAL, *sen trip'e tal*, **FORCE**, the force which is directed inward toward the center of curvature and forces a body to move in a curved path. It is thus the force that counteracts centrifugal force, explained above. Centripetal force keeps the revolving grindstone from flying to pieces. Gravity is the great centripetal force of the rotating earth.

CENTURY OF PROGRESS EXPOSITION, A, an international exposition, or "World's Fair", of arts and sciences, in celebration of the centennial of the city of Chicago, and of the century's achievements in discoveries and inventions, and their application to the economic and social life of the modern world.

The site of the exposition was a park of 425 acres of reclaimed land on the shore of Lake Michigan near the heart of the city of Chicago. Its opening day was May 27, 1933; it remained open during the summer months of 1933 and 1934.

The main purpose of the exposition was to show the progressive development of the arts and sciences during the preceding century in an orderly arrangement. The scientific keynote was struck on the evening of the opening day when the great electric lighting system of the exposition was set in motion by a ray of light from the distant star Arcturus. The major groups of exhibits were housed in six large buildings, strikingly dissimilar in plan and design, but each suited to its particular purpose. These six were the Hall of Science, the Hall of Social Sciences, the General Exhibits Group, the Travel-Transport Building, the Electricity Building and the Federal Building. In these buildings were displayed both pictorially and actually the discoveries in the basic sciences, and progress in all departments of economic and social life. Scores of independent exhibits supplemented these displays, all together providing an educational opportunity of greatest value to visitors.

The architectural note was frankly mod-

ernistic. Classic designs was discarded; the exteriors of the buildings were decorated in vivid colors—blues and greens, flaming scarlet, a color scheme worked out by Joseph Urban, famous architect and stage scenery designer. Entertainment of great variety was offered. The Sky Ride and Observation Towers provided thrilling experiences. The Midway, with its Belgian Village and other bits of life in other lands, offered amusement and entertainment. At the nearby Art Institute a great loan collection of paintings attracted thousands of visitors. The Adler Planetarium and the Field Museum of Natural History were largely patronized.

CENTURY PLANT. See AGAVE.

CEPHALOPODA, *sef a lop' o dah*, the scientific name of the highest class of mollusks, given them because of the fact that their arms or limbs are arranged in a group about the mouth. The name means *head-footed*. Most of them have a head more or less distinct from the rest of the body, and have complicated organs of digestion. In some species the arms are very numerous, while in others there are only a few.

Related Articles. Consult the following titles for additional information:

Cuttlefish	Octopus
Nautilus	Squid

CERAMIC, *se ram' ik*, **ART.** See POTTERY.

CERBERUS, *sur' be rus*, in classical mythology, the dog of Pluto, which guarded the entrance to Hades. Some accounts gave it a hundred, and some fifty, heads, but three was the popular number. The dog's tail and mane were snakes, and his jaws dripped with foam. The last of the labors of Hercules (which see) was his capture of the monster.

CEREALS, *se' re alz*. See GRAINS.

CEREBELLUM, *ser e bel' lum*, **THE**, that portion of the brain below the posterior lobes of the cerebrum occupying the lower back part of the cranium. The cerebellum weighs about one-eighth as much as the cerebrum, but it is proportionately larger in infants and the lower animals. The white matter of the cerebellum is located on the inside, the gray matter on the outside. The convolutions are very numerous and lie in narrow, transverse folds, separated by numerous deep fissures, placed very closely together; they appear to possess very little of the distinctive character of the fissures and convolutions of the cerebral hemispheres. The surface of the fissures is composed entirely of gray matter, and

running toward this from the interior of the cerebellum is the white substance, arranged

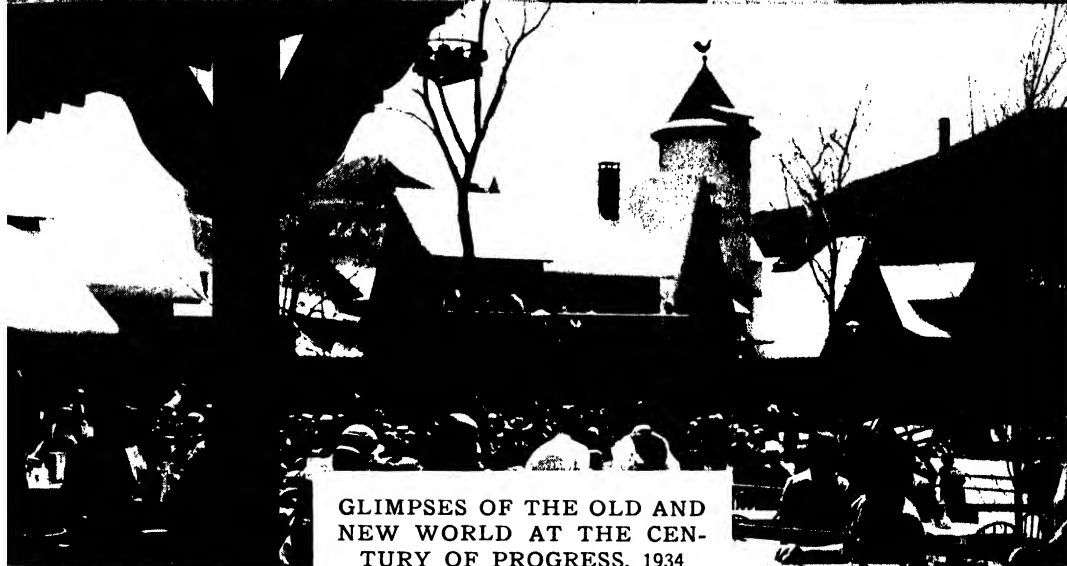


CERES, OR DEMETER

in a branching manner and called, therefore, *Arbor Vitae*, or *tree of life*. The functions of the cerebellum are to coördinate and harmonize those muscles used in walking and standing, running, jumping and other voluntary movements.

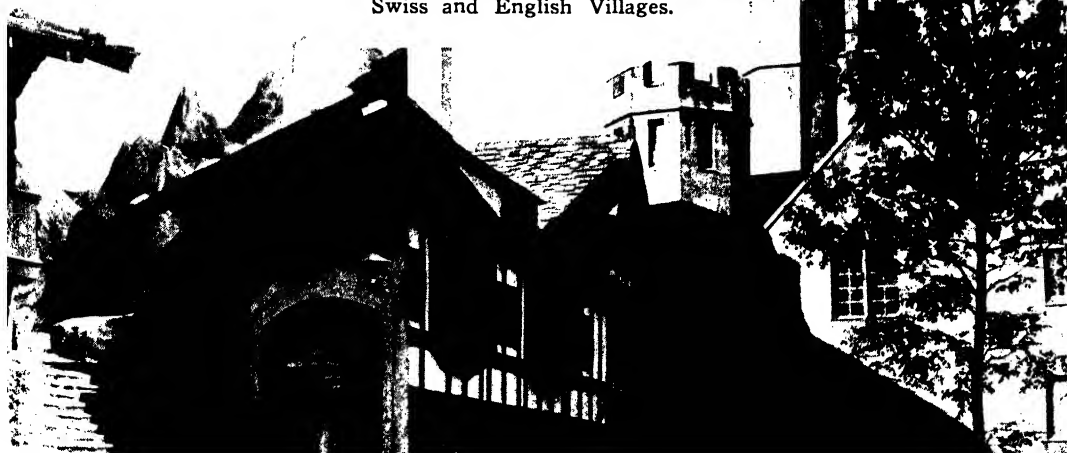
The cerebellum is illustrated in the article **BRAIN**.

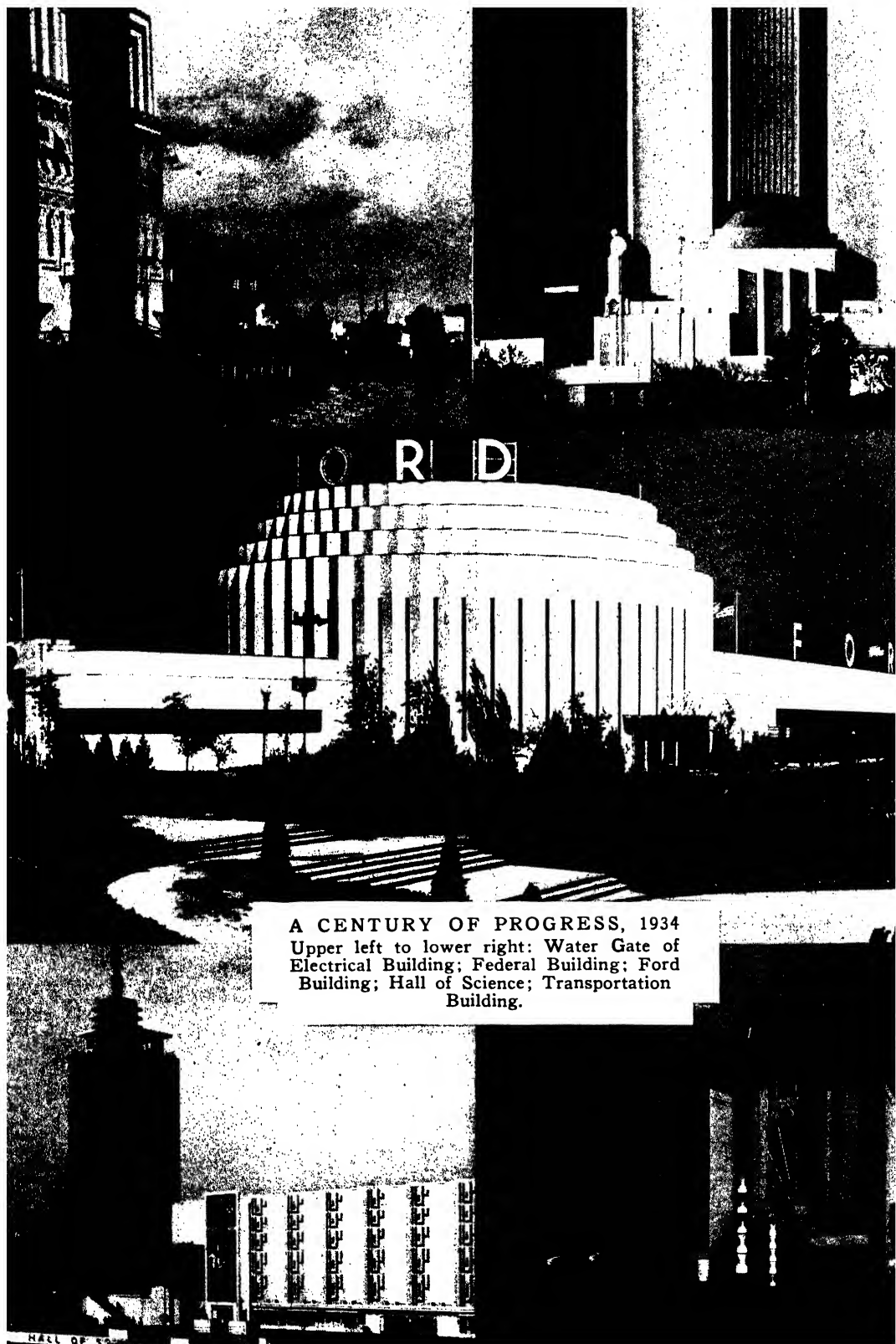
CEREBRUM, *ser' e brum*, **THE**, the largest portion of the brain. It is divided into lateral and symmetrical hemispheres. The outer surface, composed entirely of gray matter, or *cortex*, is arranged into lobes and convolutions separated by fissures, as shown in an illustration in the article **BRAIN**. The cortical layer is composed of alternate strata of gray and white matter, the entire layer being about one-sixth of an inch thick. The true interior of the cerebrum is composed of white matter. There are five great lobes, separated by fissures varying from half an inch to one inch in depth. The lobes are divided into many convolutions by secondary fissures running into those already mentioned. The importance of a study of the convolutions is becoming increasingly obvious, for experimental science has demonstrated that the gray matter found in each convolution presides over some definite function or portion of



GLIMPSES OF THE OLD AND
NEW WORLD AT THE CEN-
TURY OF PROGRESS, 1934

Upper left to lower right: Belgian,
American Colonial, Black Forest,
Swiss and English Villages.





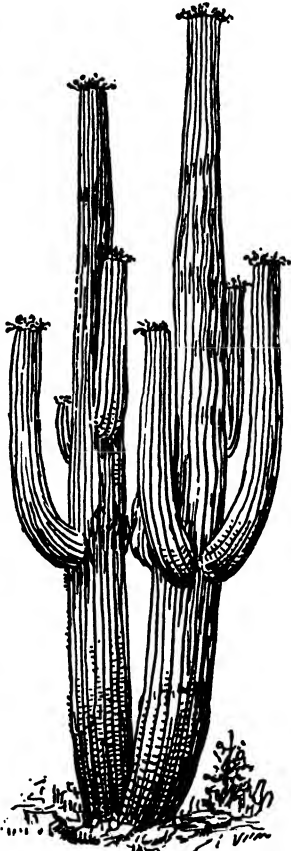
A CENTURY OF PROGRESS, 1934
Upper left to lower right: Water Gate of
Electrical Building; Federal Building; Ford
Building; Hall of Science; Transportation
Building.

the body; thus it is a fact not to be questioned that certain convolutions in the frontal lobes control the function of speech; certain others control the motions of the head and extremities on the opposite side of the body.

CERES, *se'reez*. See PLANETOID.

CERES, *seer'eez*, a Roman goddess, daughter of Saturn and Rhea, and mother of Proserpina, or Persephone. She was the goddess of the earth, in its capacity of bringing forth fruits, and especially did she watch over the growth of grain and other plants. When her daughter was stolen and carried off to Hades, Ceres neglected the earth during her search for her daughter, and all vegetation perished. The Romans celebrated in honor of Ceres the festival of the *Cerealia*, and the sacrifices made to her consisted of pigs and cows. Ceres was always represented in full attire, her attributes being ears of corn and poppies. The Greek goddess who corresponded to the Roman Ceres was known as Demeter. See MYTHOLOGY.

CEREUS, *se'reus*, a large genus of the cactus family, containing about 200 species, of which the *night-blooming cereus* is best known, for the literary allusions to it and the sentiment which surrounds it. Another familiar species is the *old-man cereus*, so called from the long gray hairs which cover the top of the stem. But more remarkable is the *giant cactus* of Arizona, which having grown to a height of fifty feet in a naked,



GIANT CACTUS

leafless column, then crowns each column-like branch with a bunch of great flowers. See CACTUS.

CERIUM, a metallic element that occurs in many minerals found in Sweden, and a mineral found in North Carolina. Cerium is of a grayish color, is ductile and malleable, and is from five to six times as heavy as water. One of its salts is used to produce a deep, blue-black color on fabrics.

CERRO GORDO, *ser'ro gor'do*, BATTLE OF, a battle in the Mexican War, fought April 17 and 18, 1847, between a force of 12,000 Mexicans, under Santa Anna, and an American force of 8,500, under General Taylor. The pass of Cerro Gordo had been fortified by Santa Anna, with the exception of one bluff which overlooked his position. Taylor occupied this height and opened fire with heavy guns upon the Mexican fortifications, at the same time making a vigorous attack upon the rear of Santa Anna's position. The Mexicans were soon compelled to flee.

CERTIORARI, *sur she o'ra're*, WRIT OF. See WRIT.

CERVANTES SAAVEDRA, *ther vahn'tays sah ah ray'drah*, MIGUEL DE (1547-1616), the greatest of Spanish novelists, the author of DON QUIXOTE. He was born at Alcala de Henares and removed thence to Madrid at the age of seven. He early commenced writing verses, and his pastoral *Filena* attracted the notice of Cardinal Acquaviva, whom he accompanied to Italy as page. In 1570 he served under Colonna in the war against the Turks and African corsairs, and in the Battle of Lepanto he lost the use of his left hand. After this he joined the troops at Naples, in the service of the Spanish king, winning the highest reputation as a soldier. In 1575, while returning to this country, he was taken by pirates and sold in Algiers as a slave. For five years he remained in captivity, displaying great courage in the face of constant danger of torture; but at length his friends and relations ransomed him and he rejoined his old regiment.

In 1583 he retired from service and recommenced his literary work, publishing in 1584 his pastoral *Galatea*. In the same year he married, and then for a long time he lived by writing for the stage, to which he contributed between twenty and thirty plays, only two of which have survived

From 1588 to 1599 he lived in retirement at Seville, where he held a small office. He did not appear again as an author till 1605, when he produced the first part of *Don Quixote*. This work had as its immediate aim the satirical treatment of the sentimental novels of chivalry, then popular, but it contained such accurate pictures of human types and such a fund of delightful humor that it made its author famous at once. Between 1613 and his death were published his twelve *Exemplary Tales*, *Journey to Parnassus* and eight new dramas. The second part of *Don Quixote* was also completed during these years. See DON QUIXOTE.

CERVERA Y TOPETE, *ther va'rah e to pa'ta*, DON PASCAL DE (1839-1909), the Spanish admiral who commanded the Spanish fleet at the Battle of Santiago. He was graduated from the San Fernando Naval Academy. During the Cuban rebellion in 1868 he had charge of the blockade of the coast, but later became secretary of the navy in Spain. Upon the outbreak of the Spanish-American War, he commanded a squadron consisting of four cruisers and three torpedo boats, which was sent to American waters. It entered the harbor at Santiago de Cuba about May 19 and was there blockaded by American vessels under Admiral Sampson. On July 3, under orders, he made a reckless dash for freedom, and in a running engagement all of his vessels were sunk or destroyed and he himself was taken prisoner. On his return to Spain in September of that year he was court-martialed, but was acquitted of blame for the defeat.

CETACEA, *se ta'she a*, an order of sea animals surpassing in size all others in existence. The largest of animals of the ocean, the whale, belongs to this group, as do also the porpoise and the dolphin. The word cetacea is from the Latin *cetus*, which means *whale*.

The members of this order are true mammals; they have warm blood and breathe by means of lungs, for which purpose they come to the surface of the water to take fresh supplies of air. The body is fishlike in form, but ends in a tail which is expanded into horizontal flukes. There are no hind limbs, and the fore limbs are broad paddles, or flippers, enclosed in a continuous sheath of thick skin. The fishlike appearance is further increased by a fin on the back, but this is a simple fold of skin and does not

contain bony spines. The right whale and its allies have no teeth in the full-grown state, but, instead, have triangular plates of baleen or whalebone, which are developed on ridges across the palate. The nostrils open directly upward on the top of the head and are closed by valves of skin, which are under the control of the animal. When a cetacean comes to the surface to breathe, it blows the air out violently, and the vapor it contains, becoming condensed into a cloud, resembles a column of water and spray. As a protection against the cold, the animal is covered by a thick coating of blubber underlying the skin.

Related Articles. Consult the following titles for additional information:
Dolphin
Porpoise
Narwhal Whale

CETINJE, *tset' en yay*, a small town in Yugoslavia, formerly the capital of Montenegro. It is situated in a deep valley about 2,000 feet above sea level near the Adriatic Sea. The town has little commercial or industrial importance. The former royal palace and an old monastery are unpretentious buildings, but still of interest to travelers. It was destroyed by the Turks in 1683, 1714 and 1785, and was held by the Central Powers from 1916 until 1918. Population, 5,000. See MONTENEGRO.

CEVENNES, *sa ven'*, a chain of mountains located in the southeast of France, extending from the Pyrenees in the southwest to the Vosges in the northeast. The Côte d'Or range is sometimes considered a part of it, sometimes a part of the Vosges system. The length of the chain, exclusive of the Côte d'Or, is about 330 miles, the average height not more than 3,000 feet. The highest peak is Mézenc, 5,753 feet above the sea. The Cevennes furnished shelter for the Waldenses, Albigenses and Camisards in their days of persecution.

CEYLON, *se lon'*, a beautiful tropical island, between 6° and 10° north of the equator, called in literature the "Pearl of the Orient." It is separated from the mainland of British India, at its southern extremity by Palk Strait, about fifty miles wide. The island is 267 miles long from north to south, and 137 miles in greatest width. Its area is 25,333 square miles, a little more than three times that of Massachusetts. Its population in 1921 was 4,504,000; by the census of 1931, 5,312,548. Over half of the people are Singhalese, and

more than one-fourth are Tamils. There are only 8,000 Europeans.

There is a greater acreage of rice than of any other agricultural product; tea is second in importance. Greater than either of these in acreage is that devoted to coconut palms, for about every sixteenth acre in the entire island is given to coconut culture. Besides these three great sources of revenue there is cultivation of cinchona, cinnamon, tobacco and rubber. The surface of the island is so mountainous that not half of it is subject to cultivation. There are over 2,000 gem quarries, producing sapphires, moonstones, rubies and cat's-eyes, and there is a good deal of gold, thorium and mica.

The climate is tropical, but in the high regions it is very pleasant and cool. The mineral resources of Ceylon are considerable, including precious stones—rubies and sapphires—gold, iron and plumbago. There are three harbors, Galle, Colombo and Trincomalee, the last being one of the finest in the world. The railway lines have a length of 672 miles, and are for the most part operated by the government; a great bridge is to connect Ceylon with the mainland across shallow Palk Strait.

After 1831 Ceylon ceased to be governed from Madras, as formerly, and had its own governor. Now the island has larger local control; in 1929 a Constitution was adopted which set up a council of fifty elected and eight appointed members; there is a Cabinet of ten ministers.

In 543 B. C. the original inhabitants, the Yakkas, were conquered by the Singhalese. In A. D. 1200, the Malabars conquered the country, but later it was partly retaken by the Singhalese. The Portuguese came in 1505 and in 1517 began their settlements. These were reduced by the Dutch in the seventeenth century, and the Dutch were driven out by the British in 1795. Ceylon is one of the most prosperous of British colonies.

CHAD, also spelled **TCHAD**, *chad*, a great lake in Central Africa, almost within the great Sahara Desert. Although it has decreased greatly in size within recent years by evaporation, having once contained 100,000 square miles, it is yet one-half as large as the state of Kentucky—about 20,000 square miles. It lies at the northern borders of Nigeria and Kamerun, in French West

African territory, but within the sphere of influence of Great Britain, also. It receives the water of three rivers, but has no visible outlet; there is apparently an underground flow.

CHADWICK, **GEORGE WHITEFIELD** (1854–1931), an American musician who ranks popularly next to MacDowell as a composer. He received his early musical education in America, but later studied with the best European masters. Chadwick returned to America in 1880 to enter the New England Conservatory as instructor, and later became its director. Among his important compositions are the oratorio *Judith* and the music for the *Columbian Ode*, sung at the opening of the World's Fair in Chicago. He conducted the annual Worcester Music Festival for many seasons.

CHAFFINCH, a beautiful European finch, very common in England, where its haunts are chiefly gardens and shrubberies, hedgerows and plantations. The male, which is six or seven inches in length, has a chestnut back, reddish-pink breast, and throat and a yellowish-white bar around the wings. The chaffinch feeds on seeds, insects and their larvae. It has a strong voice that in the wild state is not pleasant, but it can be taught to sing very beautifully.

CHAIN, in surveying. See **SURVEYING**.

CHAIN STORES, a term describing groups of stores, usually in widely scattered communities, each group under one ownership and dealing in one line of merchandise. Laws in some states have declared chain stores subject to special taxes, on the ground that they are damaging to local mercantile interests, and for purposes of such taxation have declared that a minimum of five establishments under one ownership constitutes a chain. It was not uncommon several hundred years ago for one management to control several stores, but the modern chain-store systems have been developed largely since 1910.

The American chains have grown tremendously. In 1914 there were 8,000 grocery stores owned by chains; the number has now grown to more than 50,000. It is declared that in New York and Philadelphia nearly two-thirds of retail grocery sales pass over counters of the chains. Besides these groups, chains control thousands of stores selling drugs, candy, tobacco, shoes, 10-cent articles, and other necessities and luxuries. At first

located only where population is dense, chains have found it profitable to enter smaller cities everywhere.

Mercantile methods have been undergoing almost revolutionary changes. The system of retailing which was successful less than a generation ago has had to submit to modification in order to survive. Mail-order advertising grew to such proportions that the prosperity of country stores was threatened; then chain stores began to take enormous toll from individually owned establishments in thousands of cities. Small firms declare that the systems of chain stores are undermining them; that even initiative, perseverance and good salesmanship are unable to prevail against their lure. Local stores offer service not provided by the chains; they frequently extend credit to their customers, and they deliver purchases free, and the chains do neither of these.

The sponsors of the chain stores, on the other hand, justify their system by declaring that each store in such a group is reducing the cost of living; it is claimed that management is more efficient; profits are small on each individual sale, while admittedly large in the aggregate. Further, the claim is advanced that employees live in the communities served, and help to sustain local interests; that as the reward of management the owners receive a final profit that is very small—reported to be not more than 2 per cent.

CHALCEDONY, *kal sed'o ni*, a variety of quartz, so called because it was first found in abundance near Chalcedon, in Bithynia. There are many different kinds of chalcedony, known variously as agate, onyx, chrysoprase, sard, carnelian and sardonyx. The common form, also called white agate, has the appearance of milk diluted with water. It is semitransparent, and is more or less clouded with spots. Polished chalcedony is employed in making various forms of jewelry and ornamental articles. In Chalcedony Park, Arizona, there is a forest of fossil trees, the wood fibers of which have been replaced by a chalcedony deposit from water.

CHALDEA, *kal de'ah*, an ancient district southeast of Babylonia, on the Persian Gulf, and notable in early Bible records. Little is known of its history, except that its inhabitants were a warlike people who preserved their independence at all times. At various periods in the early history of

Babylonia, Chaldean princes sat on the throne, but it was toward the end of the seventh century B. C., after the Chaldean, Nabopolassar, overthrew the Assyrian rule and founded the New Babylonian kingdom, that Chaldea became supreme in Mesopotamia. Nabopolassar's son Nebuchadnezzar was the greatest of this dynasty, which closed 556 B. C. Hebrew and classical writers, not only of this period but of later times, use the names Babylonian and Chaldean synonymously. See **BABYLON**; **BABYLONIA**.

CHALDEE, *kal'de*, **LANGUAGE**, a name often given to the Aramean language, one of the principal varieties of the ancient Semitic. Chaldee literature is usually arranged in two divisions: the Biblical Chaldee, or those portions of the Old Testament which are written in Chaldee, namely, certain chapters in *Daniel*, *Ezra* and *Jeremiah* and the Chaldee of the *Targums* and other later Jewish writings. See **ARAMAIC**.

CHALEURS, *shalur'*, BAY, an inlet of the gulf of Saint Lawrence, which partially separates New Brunswick from the province of Quebec. Its length from east to west is 185 miles and its greatest width is twenty miles. The water is deep, and the bay affords good anchorage for sea-going vessels. Fishing is the chief industry in the towns along the banks. This inlet was discovered and named by Jacques Cartier, in 1535. The name Chaleurs means *bay of heat*.

CHALK, *chawk*, a variety of limestone formed almost wholly of the shells of minute marine animals, known as *foraminifera* (which see). It is usually white or gray, coarse-grained and so soft that it cannot be polished. Impurities, however, sometimes give it other colors. It is used in the manufacture of cement, for making lime for whitewash, and for marking on blackboards; when prepared for the last named purpose it is ground and pressed into slender sticks.

Chalk is found in large quantities in various parts of the world. It forms the white cliffs that border the English channel and to whose color England owes its ancient name of *Albion*. It extends into Northern France, and over the chalk hills of Flanders the contending armies in the World War fought desperately. The trenches dug for protection were cut from the chalk deposits in many places. In the United States large quantities are found in Arkansas, Iowa, Montana, Texas and some

CHALDEA

Chaldea and Babylonia

Sargon, King of Chaldea.....3800 B.C.
 Babylon Becomes the Political
 Center About.....2400 B.C.
 Chaldea Captured by Assyrians.....2286 B.C.



KING AND QUEEN OF UR WITH HARPIST- 3000 B.C.

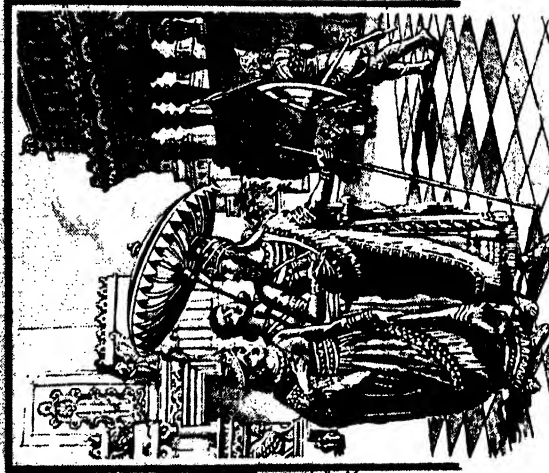


BABYLONIAN WRITING. FIRST USE OF WHEELS

ASSYRIA

Chronological Summary

Assyria
 Tiglath-Pileser I.....1130 B.C.
 Asur-Nazir-Pal.....883 B.C.
 Tiglath-Pileser II.....745 B.C.
 Ten Tribes of Israel Captured.....722 B.C.
 Sennacherib.....701 B.C.
 Esarhaddon.....683 B.C.
 Asur-Bani-Pal.....668 B.C.
 Fall of Nineveh.....606 B.C.



ASSYRIAN KING AND QUEEN - ABOUT 700 B.C.

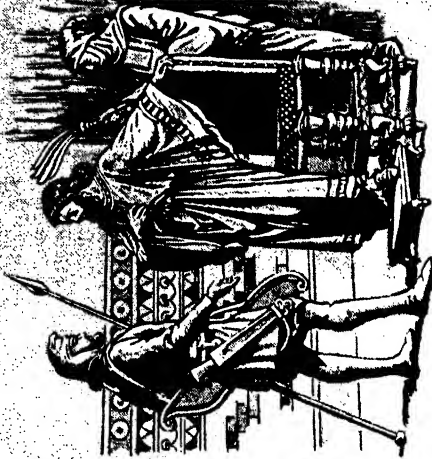
PERSIA

Persia

Caxares, King of Persia.....625 B.C.
 Nineveh Captured by Medes.....606 B.C.
 Cyrus Captures Babylon.....538 B.C.
 Darius I.....522 B.C.
 Persians Defeated at Marathon.....490 B.C.
 Xerxes Defeated at Thermopylae.....480 B.C.
 Battle of Arbela.....331 B.C.



SYMBOL OF THE PERSIAN'S GOD



PERSIAN WARRIOR - NOBLEMAN AND SERVANT

other states. The Texas belt is over 250 miles in extent and is nowhere less than 600 feet thick.

CHALLENGER EXPEDITION. In 1872 the British government sent the *Challenger*, a corvet of a little more than two thousand tons burden, on a long trip around the world, for the purpose of sounding the depths of the ocean, mapping the basins and studying the life of the Atlantic, Southern and Pacific oceans. The *Challenger* spent nearly four years on this expedition and traveled nearly 70,000 nautical miles; it made investigations at 362 stations, making the deepest soundings in March, 1875, at 4,575 fathoms. See FISHES, DEEP SEA.

CHALONS, shaloN', BATTLE OF, one of the great decisive battles of history, fought in Gaul in A. D. 451, near the modern French city of Châlons-sur-Marne. The battle was fought between a Roman allied army under Aetius, and a great force of Huns commanded by Attila. The Romans and their allies won the day, and saved Europe from the domination of the barbarians. It is significant that two decisive battles of the World War were fought in the same valley. In 1914 Paris was saved by the German defeat along the Marne, and in 1918 the Germans were again checked along this river at a time when Paris was again seriously threatened. See MARNE, BATTLES OF THE.

CHAMBERLAIN, chaym'bur lin, the family name of three eminent English statesmen, father and two sons.

Joseph Chamberlain (1836-1914) won renown as one of England's greatest Colonial Secretaries. He entered Parliament in 1876 as a representative of Birmingham, and under Gladstone's premiership he became President of the Board of Trade and a Cabinet Minister. Though at that time a Liberal, he later broke with Gladstone because of the latter's advocacy of Home Rule, and after 1886 he was one of the most pronounced members of the Liberal-Unionist party.

In 1895 he entered the Cabinet of Lord Salisbury as Secretary of State for the Colonies. From this time on Chamberlain worked zealously for the promotion of a closer union between the mother country and the colonies, and he was the leading figure in the movement for tariff reform. He proposed the imposition of duties on goods from foreign countries, that the colonies might enjoy trade preferences, and on this

issue the Liberal-Unionists went down to defeat in the elections of 1905.

[Joseph] **Austen Chamberlain** (1863-1937), oldest son of Joseph Chamberlain, entered Parliament in 1892. From 1895 to 1900 he held the position of Civil Lord of the Admiralty, and from 1900 to 1902 was Financial Secretary to the Treasury. In Balfour's Cabinet he served as Postmaster-General and Chancellor of the Exchequer, and after 1906 took his father's place as active leader of the tariff reformers. While Foreign Secretary, 1924 to 1929, he assisted in formation of The Locarno Pact, and was awarded the Nobel Peace prize.

Neville Chamberlain (1869-), second son of Joseph Chamberlain, began his public life in Birmingham. From 1911 to 1915 he was prominent in the city council and was Lord Mayor, 1915 to 1916. He was Director General of National Service, 1916-17, Postmaster General, 1922, Paymaster General and Minister of Health, 1923, and Chancellor of the Exchequer, 1923-24. In 1931 he again became Chancellor of the Exchequer in the MacDonald Cabinet, and after 1935 in the Cabinet of Stanley Baldwin. On the latter's resignation in May, 1937, Chamberlain succeeded him as Prime Minister.

CHAMBER OF COMMERCE, a board chosen from among the merchants and traders of a city to protect the interests of commerce; to lay before the legislature the views of their members on matters affecting commerce; to furnish statistics as to the trade of the locality, and to attain by combination advantages which could not be reached by individual enterprise. Nearly every city has a chamber of commerce, which is usually an important factor in its commercial life.

In large cities bodies called chambers of commerce exist for another purpose. They buy and sell stocks and bonds of railroads and industrial enterprises, furnishing a market always where buyers and sellers can dispose of or come into possession of securities.

CHAMBER OF COMMERCE OF THE UNITED STATES, an organization to promote the nation's business interests, formed at a conference called by President Taft in 1912. Its membership is composed of members of local chambers of commerce and other business men's associations. The organization studies business prospects, fluctuations, dangers and opportunities, statistics of pro-

duction and of labor, and it watches legislation in Congress which affects business. Reports of all these activities are made to the membership. The national headquarters are in Washington, D. C.

CHAMBERS, *chaym'berz*, ROBERT WILLIAM (1865-1933) an American novelist who has gained a wide circle of readers. In 1918 the advertisements for his *Restless Sex* carried the statement that this was his forty-eighth book. His novels are generally romances of modern society, and they deal rather frankly with some of the unwholesome aspects of that phase of life. On the whole they are not to be recommended to young people. Chambers was an illustrator before he became a novelist, and after a course of study at the Julien Academy at Paris he made sketches for *Life*, *Truth*, *Vogue* and other periodicals. The titles of his books include *The Fighting Chance*, *The Firing Line*, *The Common Law*, *The Girl Philippa*, *Barbarians*, *The Crimson Tide*, *The Little Red Foot*, *The Man They Hanged*, *The Drums of Aulone*, *The Sun Hawk*, and *The Happy Parrot*.

CHAMBERSBURG, PA., the county seat of Franklin County, about fifty miles southwest of Harrisburg, on the Conococheague Creek and on the Western Maryland and the Pennsylvania railroads. It has Wilson College (Presbyterian), for women, Penn Preparatory School for Girls, a fine courthouse, a public library, a memorial fountain, an old people's home and a children's home. There are railroad shops and manufactures of men's clothing, silks, woolens, paper, flour-milling machinery, transmission machinery, hosiery, and flour. The place was settled by Benjamin Chambers in 1730 and was first known as Falling Spring; it was incorporated in 1803. The city has established several playgrounds. Population, 1930, 13,788.

CHAMELEON, *kam'e'le un*, a genus of lizards, natives of the Old World, but found also in the Southern United States and the West Indies. The best-known species has a naked body six or seven inches long, and feet and tail all suitable for grasping branches. The skin is cold to the touch and contains small grains which in the shade are of a bluish-gray color, but which in the light of the sun become a grayish-brown or tawny color.

The chameleon possesses the curious power, however, of changing its color, either in ac-

cordance with its surroundings or with its temper, when disturbed. Its power of fasting and habit of inflating itself gave rise to the fable that it lived on air, but in reality it feeds upon insects, taking its prey by rapid movements of a long, sticky tongue. In general habit chameleons are dull and sluggish. They are often kept as pets.

CHAMINADE, *sha me nahd'*, CECILE LOUISE STEPHANIE (1861-), a French composer who is noted for the charm and originality of her work. At eight years of age she had composed sacred music of considerable merit, and after several years of study under eminent teachers she made a successful début in 1879. Thereafter she appeared frequently in concert as a pianist, but devoted herself especially to composition. Probably her best-known instrumental composition is the *Scarf Dance*, but her fame chiefly rests upon her songs, whose quaint melodies and charming accompaniments have made them very popular. The most important are *Berceuse*, *Rosamonde* and *The Silver Ring*.

CHAMOIS, *sham'my*, a goatlike antelope, living in the high mountains of Europe and Western Asia. It is a rather small animal, with a brownish coat that changes to faun color in summer and gray in the spring. Its head is of a pale yellow color, marked by a black band surrounding the eyes and extending from the nose to the ears. Its horns, which are about six or seven inches long, are round and almost smooth, and they grow straight upward until near the tip, where they suddenly end in a sharp hook that is bent backward. The tail is black.

During the feeding time, which is in the morning, one animal is always standing on guard in some prominent place for the purpose of warning the rest of approaching danger. The fleetness of the chamois, the roughness of the mountains which it inhabits, and its powers of smell, make its pursuit both difficult and dangerous. Though the flesh is highly prized as food, the chief value of a chamois lies in its skin, which is used to make the very soft, flexible leather known as *chamois skin*.



CHAMOIS

CHAMOMILE, or **CAMOMILE**, *kam'omile*, a well-known plant belonging to the natural order Compositae. It is perennial and has slender, trailing, hairy, branched stems. The flower is white, with a yellow center. Both leaves and flowers are bitter and aromatic. The fragrance is due to the presence of an oil, of a light blue color when first extracted. Both the leaves and the flowers are employed in fomentations and poultices, and also in the form of an infusion. Chamomile is cultivated in gardens in the United States and Canada, and is also found wild, especially in the form of the common troublesome *mayweed*.

CHAMPAGNE, *sham pane'*, a sparkling white wine made in the French department of Marne. It is so called because the vineyards are in the former province of Champagne. The greenish-white juice of the wine grapes, which are produced on a peculiar chalky soil, contains a high percentage of sugar. In the process of fermentation this is changed into alcohol and carbonic-acid gas. The latter tends to dissipate itself in air, but in the making of champagne, just enough of the gas is retained in the wine to give it its characteristic sparkle. It is customary to blend the juices from several different vintages before the liquid is placed in bottles for fermentation. During the process the bottles are inverted on perforated tables and shaken gently every day over a period of weeks, to permit the sediment to settle on the corks. For those who like sweet wine, the champagne is flavored with liqueurs. Unflavored champagne is said to be dry ("sec"). The sweeter varieties are preferred in France; in America the dry is favored.

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CHAPARRAL, *chap a ral'*, incorrectly spelled *chapparral*, refers to any dense thicket of shrubs or dwarf trees. It is a common term in the Southwestern United States and in Mexico.

CHAPLAIN, *chap'lin*, any person empowered to conduct special religious services, as in an army or for a society. In armies chaplains are given commissions as noncombatant officers. In the United States armies prior to the World War there were sixty-seven chaplains; of these fifteen were majors, and the remainder were captains or first lieutenants, according to length of service. In the navy chaplains rank up to captain.

CHAPLEAU, *shah plo'*, SIR JOSEPH ADOLPHE (1840-1898), a Canadian statesman, born at Ste. Therese de Blainville, Quebec, and educated at the college of his native town and at Saint Hyacinthe. He began the practice of law in Montreal, and in 1873 was created queen's counsel. Chapleau became a member of the Quebec legislature, and at the union of the provinces in 1867 became solicitor-general for Quebec. In 1878 he was chosen leader of the Conservative opposition in the Quebec assembly, and the following year was appointed premier of the province. Appointed Secretary of State for Canada in 1882, he continued in this position with the Abbott Ministry. Later, for a short time, he was Minister of Customs, and in 1892 was appointed lieutenant-governor of Quebec. A ready speaker and a keen debater, Chapleau was generally considered the leading French-Canadian orator of his time.

CHAPMAN, FRANK MICHLER (1864-), an American authority on ornithology, was born in Englewood, N. J., and educated at Brown University. His professional career began as associate curator in the division of ornithology and mammalogy in the American Museum of Natural History in New York City in 1888, and then became curator of the department. During the World War he was director of publications of the Red Cross Society and the society's commissioner to Latin America. Chapman wrote many books, the most valuable as a reference work being *Handbook of Birds of Eastern North America*.

CHAPMAN, GEORGE (1557-1634), an English poet, the earliest and perhaps the best translator of Homer. The *Iliad* was published in installments from 1598 to 1611; the *Odyssey* appeared in 1614-1615. These

translations have been highly commended by such poets as Pope, Keats and Coleridge, and by Lamb, but they have also been criticised somewhat on the score of inaccuracy. Keats's sonnet, *On First Looking into Chapman's Homer*, is well known.

CHAPULTEPEC, BATTLE OF, a battle of the Mexican War, fought September 12 to 14, 1847, in the campaign against Mexico City, between 7,000 Americans, under General Scott, and a Mexican force of 25,000, under General Santa Anna. The Americans made a vigorous attack upon the castle, which was captured, together with a force of nearly 1,000 Mexicans.

CHARADE, *sha radé'*, a kind of riddle, the subject of which is a word composed of several syllables, each of which can be taken as a separate word. Each syllable, considered as a separate word, is either described or dramatically represented, and finally the whole word is given a sort of enigmatic definition. The following is an example: "Some one threw my first and second at me, and it hit my third. It did not hurt me, for it was only a branch of my whole." Answer, *Mistletoe*. When dramatic representation is used to indicate the meaning of the syllables and the whole word, the puzzle is called an acting charade. See ENTERTAINING, SUGGESTIONS FOR.

CHARCOAL, a variety of coal obtained by burning wood or bones with a limited supply of air. Wood charcoal is prepared by piling billets of wood in a pyramid form and causing them to burn slowly under a covering of earth, or in a closed kiln. In consequence of the heat, part of the combustible substance is consumed, part is volatilized, together with a portion of water, and there remains behind the carbon of the wood, retaining the form of the tissue. Wood charcoal, well prepared, is of a deep black color, brittle and porous, tasteless and inodorous. A partly burned stick of wood in a fireplace is a good example of charcoal.

Charcoal is insoluble in water and is not affected by it at low temperatures; hence, wooden stakes which are to be immersed in water are often charred to preserve them, and the ends of posts stuck in the ground are often thus treated. Owing to its peculiarly porous texture, charcoal possesses the property of absorbing a large quantity of air or other gases at common temperatures and of yielding the greater part of them

when heated. Charcoal likewise absorbs the odoriferous and coloring principles of most animal and vegetable substances, and hence it is a valuable deodorizer and disinfectant.

It is used as fuel in various arts, where a strong heat is required without smoke. It is used also in the manufacture of gunpowder. In the form of ivory black and lampblack, it is the basis of black paint; and mixed with fat oils and resinous matter, to give a due consistency, it forms printing ink. See BONEBLACK; LAMPBLACK.

CHARD, a form of garden beet cultivated for its leaves, which are eaten as greens, but particularly for the center rib of the leaf. The latter is cooked about the same way as asparagus. Chard is grown in the same way as the garden beet, from which it differs in having small, woody roots.

CHARGE D' AFFAIRES, *shahr zha' da fair'*, a French word meaning *in charge of affairs*, refers to a man who is in temporary charge of a diplomatic post, in the absence of his superior. However, the title is sometimes given to a permanent official in a diplomatic post too unimportant to be dignified with a diplomat of high rank.

CHARGE OF THE LIGHT BRIGADE, a poem by Alfred Tennyson in which the keynote is the familiar passage—

Theirs not to make reply,
Theirs not to reason why,
Theirs but to do and die.

This inspiring ballad commemorates the charge of an English brigade of light cavalry, which was almost wiped out during the battle of Balaklava, in the Crimean War. Through a mistake in giving orders, the "noble six hundred" were commanded to charge the Russian guns at the end of a long valley. Though obedience meant certain death to nearly all, the brigade charged at the word of command, and only a remnant returned. The poem has served to keep alive the memory of the heroic band that so splendidly acted out the maxim, "Obedience is a soldier's first duty." The ballad was first published in 1855. See BALAKLAVA; CRIMEAN WAR.

CHARIOT, an ancient two-wheeled vehicle used in war or in processions of state. It was the first wheeled vehicle used by man. The common form of the ancient chariot was that of a vehicle on low wheels, open behind and at the top, the sides and front being about four feet in height. Chariots were

used by the Egyptians, Assyrians, Greeks and Romans. They were strongly and often elegantly built, but were not well suited to speed. Among the ancient nations chariots were of great importance in war. There are a number of sculptures which give a clear idea of the Assyrian chariots. These resemble the Egyptian in all essential features, containing almost invariably three men—the warrior, the shield-bearer and the charioteer. War chariots had sometimes scythelike weapons attached to each extremity of the axle, as among the ancient Persians and Britons. Among the Greeks and Romans chariot races were common, and there is an excellent description of one in Wallace's *Ben Hur*.

CHARITY, SISTERS OF, also known as Sisters of Mercy, the name given to a number of orders of women in the Roman Catholic Church. The first organization was established in France by Saint Vincent de Paul in 1629. The Order was approved by the Pope, and it spread rapidly. The members are forbidden to marry, and they devote their lives to the care of the sick and the destitute and to the protection of homeless children and the aged. The Order has spread wherever the Roman Catholic Church is found, and is one of the strongest, most widely known and generally appreciated organizations within that Church. Because of their self-sacrificing lives and their systematic devotion to assisting the needy, these orders have been spared persecution many times during religious conflicts, and they have been saved by opposing forces when cities in which they were established were besieged and nearly destroyed. There are a number of Orders in America which are popularly known as Sisters of Charity. One of these was founded in Maryland in 1809, under a distinct rule, and has a number of houses in the United States.

CHARITY AND CHARITIES. The instinct to help a fallen brother is not a new thing; it is as old as human nature itself. But organized charity is a product of later civilization. Before the establishment of the Christian Church such a thing as institutional charity was almost unknown. States as a rule did not concern themselves with the care of the deformed, the diseased and the outcast, and in some cases society avoided the burden by deliberately putting these unfortunates to death. With the spread of Christianity and its beneficent teachings of love for one's fellowmen, charitable enterprise became

common in Europe wherever Christian churches were planted. To-day the churches are still important agencies of relief, but the service has broadened immeasurably, because unity of effort has supplemented the independent efforts of separate denominations. Many of the great charity organizations of modern times are undenominational.

In 1869 the first relief society of this nature was organized in London, and since then numerous others have been established in various parts of the world, under such names as Associated Charities, United Charities, Charity Bureau, etc. The first American organization originated in Buffalo, N. Y., in 1877; the example of Buffalo has been followed by about 150 other American cities, and by nearly all the large Canadian cities.

These charity bureaus are supported by voluntary contributions. Boards of directors chosen from the contributors act as administrators, and the work is performed by trained superintendents and their assistants. The work includes investigation, the systematic recording of all information, personal visiting, donation of supplies to needy families, aiding the unemployed to find work, and coöperation with various organizations whose activities connect themselves with relief work. These bureaus are active in interesting communities and city governments in establishing playgrounds, recreation centers, public baths, etc., and they work for legislation relating to social and economic reform.



Soldier of the period

C **HARLEMAGNE**, *shahr'-le mane*, or **CHARLES THE GREAT** (742-814), the outstanding figure of his age, and one of the greatest characters in all history. He was a king of the Franks and the first of the Holy Roman emperors. Charles Martel was his grandfather and Pippin the Short his father. With his brother Carloman Charles succeeded to the throne, and on the death of Carloman the free vote of the Franks made him sole king.

His reign of forty-six years was filled with wars and conquests, as during that time he undertook fifty-two campaigns, the chief of which were against the Lombards, the Sara-

cens and the Saxons. When Desiderius, king of the Lombards, sought to obtain the succession for the children of Carloman, Charlemagne marched against him, seized all his possessions and placed on his own head the famous "Iron Crown of Lombardy" (774). Before leaving Italy he visited Rome and confirmed the donation made by his father to the Pope, of certain portions of Lombardy. This was the beginning of the papal claims to temporal supremacy. In 777 Charlemagne made an expedition against the Saracens in Spain. He was victorious, but on the return march across the Pyrenees, the rear of his army was attacked by the Gascons and Basques, wild mountaineers of that region, and cut to pieces in the famous Pass of Roncevalles.

Charlemagne's most frequent and important campaigns were against the Saxons, one of the few pagan German tribes at this time. He was determined to establish Christianity among them at any cost, but for more than thirty years they resisted him. During this struggle, after one of the innumerable revolts, Charlemagne had 4,500 Saxon prisoners put to death at one time. The Saxons at last yielded, and most of the leaders were baptized.

In the year 800 Charlemagne was called to Rome by Pope Leo III to aid him against a hostile faction. The king speedily punished the Pope's enemies, and before leaving Rome was rewarded for his services. During the festivities in the Cathedral of Saint Peter on Christmas Day, Pope Leo approached the kneeling king, placed on his head a crown of gold and proclaimed him emperor of the Romans, the consecrated successor of Caesar Augustus and Constantine.

Charlemagne is famed as a statesman and patron of learning. Under his rule commerce was protected, and robbers who preyed upon traveling merchants were severely dealt with; agriculture was encouraged and improvements were taught to the farmers, the emperor's own estates being a praiseworthy model. Charlemagne formed at his court a school for the nobles and their sons, and he himself learned to read Latin and even Greek, although he could not write legibly. He was married four times, and left one son, who became Louis I, surnamed *The Pious*. Charlemagne's empire, at his death, extended from the Baltic to the Mediterranean, from the Atlantic Ocean to the Danube, thus in-

cluding modern France, Germany, Holland, Belgium, Switzerland, Hungary, a little of Spain and most of Italy. His capital was at Aix-la-Chapelle. After Charlemagne's death the empire was harassed by the Northmen and by internal dissension, until finally, by the Treaty of Verdun in 843, it was divided among his three grandsons, Charles, Lothair and Louis, the divisions made laying the foundations, subject to some territorial changes, of the modern nations, France, Italy and Germany, respectively.

Related Articles. Consult the following titles for additional information:

Charles (France)	Holy Roman Empire
Charles Martel	Iron Crown
Franks	Pepin

CHARLES I, or KARL I (1887-1922), the last emperor-king of Austria-Hungary. His brief and troubled reign lasted from November, 1916, to November, 1918, and his abdication in the latter year was a fulfilment of the often-heard prophecy that after the death of Francis Joseph the dual monarchy would cease to exist. Francis Joseph, great-uncle of Charles, died in 1916 after a reign of sixty-eight years. The heir-apparent, Francis Ferdinand, had been assassinated on June 28, 1914, at Sarajevo, Bosnia. This event precipitated the World War, the horrors of which no doubt hastened the death of the aged emperor-king. His grand-nephew Charles ascended the throne of Austria on November 21, 1916, and was crowned king of Hungary on December 30. As he was known to be liberal in his views and not in sympathy with the war aims of the German militarists, much was expected of him in the direction of securing peace.

The situation, however, was beyond his control. Austria-Hungary was a combination of antagonistic peoples, not a united state, and as the war progressed disunion and discontent increased to such an extent that the dissolution of the dual monarchy could not be averted. In October, 1918, when the Germanic alliance was on the point of collapse, Charles made a last desperate effort to save his throne by proposing a federalization of the states composing the Austro-Hungarian state. Unsuccessful in this attempt, he issued on November 11 a proclamation relinquishing control of the government. While this was not a formal abdication it was regarded as such. The deposed emperor and his family retired to Eckartsau, a small place on the Danube, fifteen miles from Vienna. In

March, 1919, they went to Switzerland, hoping there to secure permanent asylum. On attempting to recover his throne, he was arrested and banished to the Madeira Islands, where he died, 1922. See AUSTRIA-HUNGARY; WORLD WAR.

CHARLES I (1600-1649), king of Great Britain and Ireland, son of James I. He married Henrietta Maria, daughter of Henry IV of France, and in 1625 succeeded to the throne. He was the first of the House of Stuart. After dissolving three Parliaments, because they would not grant him money unconditionally, he concluded to reign alone. This he did for eleven years, using the arbitrary courts of High Commission and Star Chamber as a kind of cover for pure absolutism, and raising money by unconstitutional or doubtful means. His attempts to introduce an Anglican liturgy into Scotland produced violent tumults, and gave origin to the famous *Covenant* in 1638, to oppose the king's design. An army was sent north, but was defeated by the army of the Covenanters, and in 1640, to secure funds to put down the Scottish insurrection, Charles was compelled to summon Parliament.

The body which assembled at that time became the famous Long Parliament, for it continued its sessions for twelve years. Charles agreed no better with this assembly than he had with the earlier Parliaments, and matters soon came to open rupture. The king had on his side the great bulk of the gentry, while nearly all the Puritans and the inhabitants of the great trading towns sided with the Parliament. The first action, the Battle of Edgehill, gave the king a slight advantage; but nothing very decisive happened till the Battle of Marston Moor, in 1644, when Cromwell routed the royalists. The loss of the Battle of Naseby, the year following, completed the ruin of the king's cause. Charles at length gave himself up to the Scottish army at Newark, in 1646, and by them he was handed over to the English Parliament. His death was at length demanded by the army, he was brought to trial, condemned and beheaded, in 1649. Then followed the period of the Commonwealth, under Cromwell. See COMMONWEALTH OF ENGLAND; CROMWELL, OLIVER.

CHARLES II (1630-1685), second of the Stuart kings of Great Britain and Ireland, son of Charles I and Henrietta Maria of France. After his father's defeat in the

Civil War Charles left England for France, and on his father's death he took the title of king of England, though not the throne. In 1651 he accepted an invitation from the Scots, who had proclaimed him their king, and passing over to Scotland, was crowned at Scone. Cromwell's approach made him take refuge among the English royalists, who, having gathered an army, encountered Cromwell at Worcester and were defeated. Charles escaped to France. On the death of Cromwell, the Restoration, effected without a struggle by General Monk, set Charles on the throne, and his entry into the capital (May 29, 1660) was greeted with universal acclamations. His Parliament soon allowed to him all the prerogatives which an earlier Parliament had fought to prevent Charles I from assuming, and he resorted to various illegal measures for obtaining money to support his extravagant court. Charles and the court by which he was surrounded displayed the most disgraceful licentiousness.

CHARLES VI (1368-1422), king of France, son of Charles V, whom he succeeded in 1380. His four uncles, who ruled during his minority, were in constant conflict, and the result was that when Charles took the power in his own hands he found the country in a most disturbed condition. For several years he ruled wisely, but he became insane in 1392, and his great vassals at once recommenced their conflicts. Henry V of England, taking advantage of the disturbed condition, invaded the country and won important victories, by means of which he compelled Charles VI to acknowledge him as his successor on the throne of France.

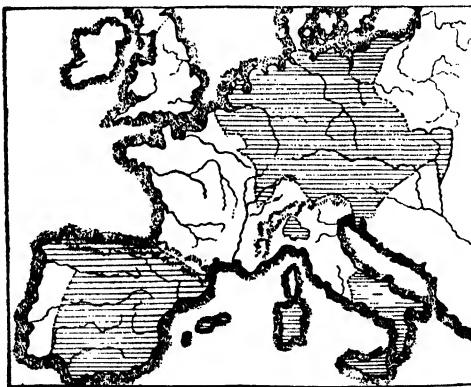
CHARLES VII (1403-1461), king of France, son of Charles VI, whom he succeeded in 1422. The crown of France at his accession was claimed by the English for their king, Henry VI, in accordance with a treaty wrung from Charles VI (which see), and the English had possessed themselves of the greater part of France. Charles seemed utterly incapable of asserting his rights, and it was not until the appearance of Joan of Arc (see **JOAN OF ARC**) in the French army that things were favorable for the French. In 1429 Charles was crowned king, and gradually the English were driven from France. Charles was a weak ruler, but the country was prosperous during his reign.

CHARLES IX (1550-1574), king of France, son of Henry II. He came to the

throne on the death of his brother, Francis II, in 1560. Even after he was declared of age, his mother, Catharine de' Medici, who had been regent during his minority, held the chief power, and his rule was from the beginning much disturbed by the conflict between the Catholics and Protestants. These conflicts terminated in the massacre of Saint Bartholomew's Day (1572), to which Charles, through the influence of his mother, had been obliged to give his consent. His remorse over this massacre was extreme. See **BARTHOLOMEW'S DAY, SAINT; HUGUENOTS**.

CHARLES X (1759-1836), king of France, grandson of Louis XV, and last of the Bourbon line of kings. When the Revolution broke out in 1789, he left France and remained in exile until the restoration of the Bourbons. During the reign of his brother, Louis XVIII, he opposed all liberal measures, and after his own accession in 1824 he adopted the most reactionary policy. Public dissatisfaction was so great that in July, 1830, he was forced to abdicate. This he did in favor of his grandson, the duke of Bordeaux, but Louis Philippe had already been chosen king, and Charles was forced to flee from France.

CHARLES V (1500-1558), Holy Roman emperor, and, as Charles I, king of Spain, the grandson of Ferdinand and Isabella of Spain and of the Emperor Maximilian. He became



EMPIRE OF CHARLES V

possessed, on the death of his father, archduke of Austria, in 1506, of the Netherlands; became king of Spain on the death of Ferdinand in 1516, and three years later, when Maximilian died, was chosen as emperor over Francis I of France and Henry VIII of England. A contest with France immediately ensued, in which Charles was

completely successful; he captured Francis at Pavia and forced from him a humiliating treaty. In 1527 Rome was captured by the imperial army, and the Pope was taken prisoner, but Charles pretended to have been ignorant of the plans for this move.

Had Charles been able, at the beginning of his reign, to have turned his attention to religious matters in Germany, he might have prevented the growth of Protestantism. When, however, he did take up the question, he found that the Protestants were so strong that he was obliged to grant them concessions. A war with the Turks, a conflict with pirates and a struggle with France took his attention until 1544, when he again turned his attention to religious matters. Open war with the Protestants ensued, in which Charles was at first successful, but later defeats obliged him in 1552 to grant religious freedom to German Protestants. In 1555 he abdicated, giving Spain, with the Netherlands, to his son Philip, while his brother Ferdinand succeeded him as emperor.

CHARLES VI (1685-1740), Holy Roman emperor. When Charles II of Spain died childless, Charles claimed the throne as a rival to Philip of Anjou, who had been chosen by Charles II as his successor. The result was the War of the Spanish Succession (see SUCCESSION WARS), in which Charles had the aid of Great Britain and Holland. On the death of his brother, however, he became emperor, and England and Holland refused to aid him further in his fight for the Spanish throne. A war with the Turks and a war with Spain, in which he engaged, both terminated successfully. The latter years of this reign were spent largely in an attempt to secure the consent of the European powers to a pragmatic sanction settling the succession on his daughter, Maria Theresa (which see).

CHARLES XII (1682-1718), king of Sweden. On the death of his father, Charles XI, in 1697, he was declared of age by the estates. To his jealous neighbors this seemed a favorable time to humble the pride of Sweden, and Frederick IV of Denmark, Augustus of Poland and Peter the Great of Russia concluded an alliance which resulted in war against Sweden. With the aid of an English and Dutch squadron the Danes were soon made to sign peace, but Augustus and the czar were still in the field. Charles won several victories which, considering his youth and inferior forces, were remarkable, but at

length he was completely defeated at Pultowa (1709).

He fled with a small guard and found refuge at Bender, in Turkish territory. Here he managed to persuade the Porte to declare war against Russia; but peace was soon procured, the interests of Charles were neglected, and he was forced by the Turkish government to leave. Arriving in his own country in 1714, he set about the measures necessary to defend his kingdom against the Danes and Prussians, and the fortunes of Sweden were beginning to assume a favorable aspect when he was slain by a cannon ball as he was besieging Frederikshald.

CHARLES XIV JOHN (1764-1844), king of Sweden and Norway, originally JEAN BAPTISTE JULES BERNADOTTE, a French general, the son of a lawyer of Pau. He enlisted at seventeen, received successive promotions and became in 1794 general of division. He distinguished himself greatly in the campaign in Germany and on the Rhine. In 1799 he became for a short time Minister of War, and on the establishment of the Empire he was raised to the dignity of Marshal of France, with the title of Prince of Pontecorvo. On the death of the heir apparent to the Swedish crown the Prince of Pontecorvo was chosen as Crown Prince, went to Sweden, abjured Catholicism and took the title of Prince Charles John. In the maintenance of the interests of Sweden a serious rupture occurred between him and Bonaparte, followed by his accession in 1812 to the coalition of sovereigns against Napoleon. At the Battle of Leipzig he contributed effectually to the victory of the allies. At the close of the war strenuous attempts were made by the emperor of Austria and other sovereigns to restore the family of Gustavus IV to the throne; but Bernadotte, retaining his position as Crown Prince, became king of Sweden on the death of Charles XIII in 1818, under the title of Charles XIV.

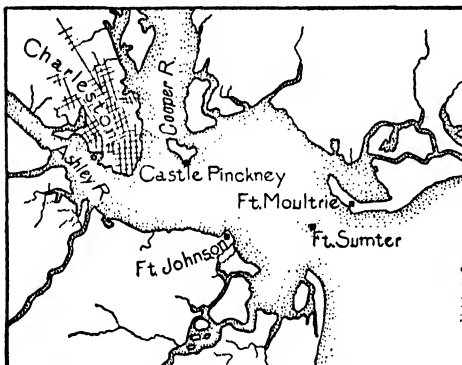
CHARLES EDWARD, the young pretender. See STUART, CHARLES EDWARD.

CHARLES MARTEL, *sharl mar tel'* (about 688-741), a Frankish leader who won undying fame by defeating the Arabs on the plains of Tours, in the year 732. By this battle the Mohammedan advance into Europe was checked and Christian civilization was saved. *Martel*, meaning *the hammer*, was a title of honor given Charles because of this victory. He was a son of Pippin Héristal.

and under the last of the Merovingian kings ruled with kingly authority, though his office was that of mayor of the palace.

CHARLES THE BOLD, (1433-1477), duke of Burgundy, the last of the great French vassals who succeeded in opposing the power of the king. He was the greatest lord in the kingdom, ruling, besides Burgundy, Flanders and a large part of the Netherlands, and for years he successfully defied Louis XI, with whom he was constantly at war. See BURGUNDY.

CHARLESTON, S. C., one of the oldest cities in the United States, founded in 1670 as Charles Town. The city is the county seat of Charleston County, and was the first capital of the state (until 1790). The location of the city assures splendid harbor facilities; it is at the junction of the Cooper and Ashley rivers, where they enter Charleston Harbor at a point seven miles from the sea. It is the most important military point



CHARLESTON HARBOR IN 1861

between Hampton Roads, Va., and the Rio Grande River, and it has the only navy yard south of Norfolk.

If Cuba did not lie across the 80th parallel of longitude, Charleston would literally be what it claims to be—the “plumb line route to Panama”—for it is directly north of Colon. Its southern position gives it the distinction of being one of the chief coal-shipping ports between the South Atlantic states and Cuba and South America; it also exports fertilizer and fuel oil. The city has a large wholesale trade and is a very important manufacturing center. There are fertilizer works, lumber interests, textile mills, foundries, and many smaller enterprises—more than 150 industrial plants.

In this city one sees public buildings of the most modern design, and many dating

from the colonial period. The Charleston Orphan House dates from 1794; Hibernian Hall, 1799; old post office, 1760; old powder magazine, 1705; South Carolina Hall, 1804. The Charleston Library is a fine building, erected in 1915; the library was organized in 1743, and is the third oldest in America. The custom house cost \$3,400,000; the navy yard has been developed at an expense of \$5,000,000. More than ordinary interest centers about the historic forts, Moultrie and Sumter (see FORT MOULTRIE; FORT SUMTER). The city has numerous parks, the largest, Hampton Park, containing 318 acres. In the residence district much distinctly colonial architecture gives the city a charming appearance.

Charleston has suffered from several calamities. In 1861 a great fire destroyed a part of the city, and during the Civil War the town experienced many of the horrors of that conflict. In 1886 a severe earthquake caused great loss, and in 1893 and 1911 tropical storms did much damage. Since that time the advance of the city has been marked; it has become the most rapidly-growing seaport between Baltimore and New Orleans, and its ocean trade has greatly increased. Its population in 1920 was 67,957; in 1930, 62,265.

CHARLESTON, W. VA., the capital of the state and the county seat of Kanawha Co., at the confluence of the Kanawha and Elk rivers, on the Chesapeake & Ohio, Baltimore & Ohio, New York Central, and Virginia railroads. The most imposing building is a fine State Capitol. There are eleven public and private hospitals, Y. M. C. A. and Y. W. C. A. buildings, seven parks and a municipal airport. The city has a fine monument to “Stonewall” Jackson. There are regular lines of steamboats on the river, and considerable shipments of coal, salt and lumber are made. The industrial establishments are railroad shops and manufactories of boilers, paint, pulp and paper products, glass, mattresses, petroleum products, chemicals, brick and tile, lumber, cement, concrete, iron and steel products. Charleston grew up around a fort which was built in 1786. It was incorporated as a town in 1794 and as a city in 1870. It has been the capital of the state since 1870, except during the decade from 1875 to 1885. Population, 1930, 60,408.

CHARLOTTE, *shahr'lot*, N. C., founded in 1750 and incorporated in 1768, is the county

seat of Mecklenburg County, 165 miles southwest of Raleigh, on the Southern (main line), the Seaboard Air Line, Norfolk-Southern, and Piedmont & Northern railways. The city contains extensive manufacturing plants, textiles and automobile tires leading in production. Within less than 100 miles of Charlotte are about 300 cotton mills, so the city is an important industrial center for a wide area. There is a school for women, the Queens-Chicora College, and Johnston C. Smith University for colored students. There are two libraries. Charlotte is the largest city in the two Carolinas. Population, 1930, 82,675.

CHARLOTTENBURG, *shahr lot'ten boork*, GERMANY, a town of Prussia, on the Spree, about three miles from Berlin, to which city it has been annexed. It was named from the castle erected for Queen Charlotte by Frederick I, in 1699. This building is one of historical interest, and in the garden is the royal tomb in which are the remains of Frederick William III, Queen Louisa, Emperor William I and Empress Augusta. The famous royal porcelain factory, established in 1761, is located here. The suburb is an important educational center and contains among other institutions a technical academy, a royal institute of glass painting, an artillery and engineering school and a gymnasium. The industries include the manufacture of machines, glass, pottery, paper, leather and chemicals.

CHARLOTTETOWN, *Shahr'lot town*, the capital of Prince Edward Island, situated on Hillsborough Bay on the southern coast and on an excellent harbor. The important buildings are the government buildings, Dominion buildings, courthouse, cathedral public library, city hall and Y. M. C. A. building. The public institutions include several hospitals, an asylum for the insane, a normal school, Prince of Wales College and Saint Dunstan's College. The leading industries include an iron foundry, railroad shops. It is the centre of the fox-farming industry. The fisheries are also important. A considerable trade is carried on and steamer connection with the principal ports of Canada is maintained. Prince Edward Island Railway extends east and west, connecting the principal points on the islands. Charlottetown was settled by the French in 1768, and was first named Port La Joie. Population, 1931, 12,361.

CHARON, *ka'ron*, in Greek mythology, the son of Erebus and Night. It was his office to ferry the dead in his boat over the rivers of the infernal regions. He was represented as an old man of gloomy aspect, with matted beard and tattered garments.

CHART, a map or drawing which presents accurately and in graphic form certain facts as to topography, climate or other conditions. A topographical chart, used extensively by surveyors, shows the exact details of land surface to be surveyed. The mariner's chart, invaluable to navigators, gives similar information about sea coasts and harbors. Everyone is familiar with the charts or maps issued by the Weather Bureau (which see), on which are portrayed the temperature, rainfall, direction of winds and all the other climatic facts of a certain locality. Charts are also made showing the position of stars and other heavenly bodies. These are called celestial charts. Educational charts are published in great variety, dealing with phases of physiology, language, agriculture, history, and the like.

CHARTER, a written instrument which certifies to a grant, contract or other agreement from a higher power to an individual, a company or a state. By charter the early governing powers in America were assigned, as to the Plymouth Company, in the north, and the London Company, in the south. Charters are granted by states to colleges and universities, conferring upon them the right to grant degrees to graduates; to bunks, allowing them to conduct business under official supervision; to local lodges and societies, by authority of the highest bodies in the organizations; to railroad companies, from state authorities, authorizing them to organize, sell stock, build their roads and operate them.

CHARTER OAK, a tree that formerly stood in Hartford, Conn., associated by tradition with an interesting episode in Connecticut history. In 1687 Sir Edmond Andros, who had been appointed governor-general of New England, went to Hartford and demanded the delivery of the charter. The colonists appeared to submit, but at the time when the ceremony was to be carried out the lights in the council chamber were extinguished and the document was carried to a hiding place in the hollow of a tree. It remained there for two years, until the deposition of Andros. Early reports of this

episode referred to the tree as an elm, and some declared that the instrument was hidden in the home of a prominent colonist; but about 1789 the belief became general that this oak had concealed the famous charter, and the tree was held in the greatest reverence until it was blown down in August, 1856. Since then a monument in honor of the tree has been erected on the place where it stood.

CHARTISM, a name given to a movement in the interests of radical reform, which was at its height in England between 1838 and 1848. The Reform Bill of 1832, while it had mended matters somewhat, had still not silenced the discontent among the laboring classes, and by 1838 matters had come to such a point that a committee of six members of Parliament and six workmen drew up a formal demand, known as the People's Charter. The reforms demanded were six in number: (1) universal suffrage; (2) equal electoral districts; (3) vote by ballot; (4) annual Parliaments; (5) no property qualification for members of Parliament; (6) salaries for members of Parliament.

William Lovett, founder of the London Workingmen's Association, was one of the early leaders of Chartism, and he consistently urged moral force rather than violence. When Parliament rejected the People's Charter, the more extreme elements gained control of the movement and bloody riots ensued. A second petition with over three million signatures was presented to Parliament, and an attempt was made to call a general strike, but nothing came of it. With the development of industrial reforms, Chartism as a separate movement died out.

CHARYBDIS, *ka rib'dis*. See **SCYLLA**.

CHASE, SALMON PORTLAND (1808-1873), an American statesman and jurist, born in New Hampshire. He was graduated at Dartmouth College, taught school for a time, but later studied law, settled at Cincinnati and acquired a large practice there. He early showed himself an opponent of slavery, and was active in the founding of the Free-Soil party (which see). From 1849 to 1855 he was United States Senator from Ohio, and vigorously opposed the extension of slavery into the new territories, being the leading opponent of the Kansas-Nebraska Bill. In 1855 he became governor of Ohio, and he was reelected in 1857. In 1860 he was an

unsuccessful candidate for the Presidency and became Secretary of the Treasury in Lincoln's Cabinet. In this post he was significantly successful in providing funds for carrying on the Civil War, but he showed some opposition to Lincoln's war policy, and resigned in 1864. In the same year he was appointed Chief Justice of the Supreme Court, and in that capacity presided over the impeachment trial of President Johnson, winning high praise for his dignity and fairness.

CHAT, a popular name of a number of different small, lively birds of the warbler family. They move about incessantly and rapidly in the pursuit of the insects on which they live. In the United States the so-called yellow-breasted chat is a larger bird, olive-green above and white below, with a yellow breast. Its song is a mixture of various songs, usually uttered only during the mating season, when the males carry on the most extraordinary performances in the air.

CHATHAM, EARL OF. See **PITT**, WILLIAM.

CHATHAM, NEW BRUNSWICK, in Northumberland County, on the Intercolonial Railway and the Miramichi River, about twenty-five miles from its mouth. It has an excellent harbor, which will admit ocean-going steamers. The town owns its water works and electric light plants. The chief industries are the manufacture of lumber, which is largely shipped to British markets, and the manufacture of wood pulp. There are also wood working factories and two foundries. Chatham is the center of an important fishing industry and is noted for its salmon and smelt fisheries; the lobster fishing at the mouth of the river is controlled from this town. There is a Roman Catholic cathedral and convent, a hospital and the exposition buildings for the northern part of the province. Population, 1931, 4,017.

CHATHAM, ONT., the county town of Kent County, founded in 1812, forty-eight miles east of Detroit, on the Thames River. It has the Canadian National, Canadian Pacific, the Wabash and the Michigan Central railroads, and there is also river traffic into Lake Saint Clair. The manufactures include automobiles, boilers, concrete products, textiles, sugar and tobacco products.

There are two hospitals and a library. The heating of the city's homes is largely by natural gas, which is piped from the Tilbury

field, fifteen miles distant. Population, 1921, 13,256; in 1931, 14,569.

CHATTahoochee, *chat a hoo'che*, a river rising in the Appalachian Mountains in Georgia, and forming for a considerable distance the boundary between Georgia and Alabama. In its lower course, after the junction of the Flint River, it is named the Apalachicola, and it is navigable to Columbus, Ga., for steamboats. The length of this river is 500 miles. The stream is described in Sidney Laniers *Song of the Chattahoochee*.

CHATTANOOGA, BATTLES OF, three simultaneous battles in the Civil War, which together constitute one of the most important engagements in the struggle. They occurred near Chattanooga, Tenn., November 23-25, 1863. The Federal army of 60,000 was under the supreme command of General Grant and faced a Confederate army of about 40,000, under General Braxton Bragg. The latter had defeated Rosecrans at Chickamauga and had taken up a position before

tack the left of their position and drive them from Lookout Mountain.

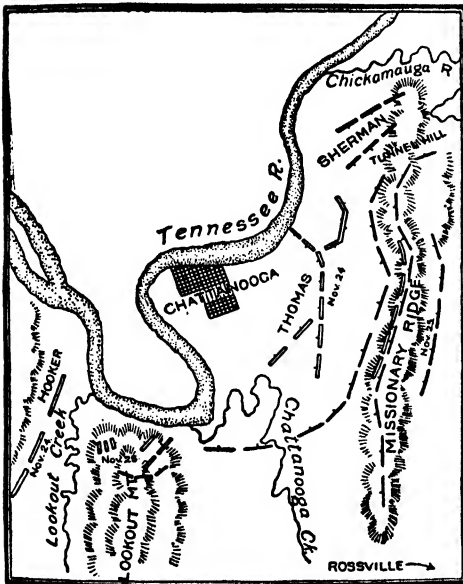
Sherman was at first successful, but was stopped by a strongly fortified gap in the mountain ridge. Thomas gained slight successes during the first day's battle, while Hooker, in the famous "Battle above the Clouds," completely routed the enemy. On the following morning Thomas's troops, ordered to make a general assault on the enemy's works at the foot of Missionary Ridge, not only accomplished this after a stubborn contest, but pressed forward without orders, under the leadership of regimental officers, climbed the hill in the face of almost irresistible fire and drove the Confederates in confusion from the summit, ending the battle.

CHATTANOOGA, *chat a noo'gah*, TENN. the third city in size in the state, the county seat of Hamilton County, in the southeast corner of the state, 150 miles southeast of Nashville, on the Tennessee River and on the Southern, the Nashville, Chattanooga & Saint Louis, the Central of Georgia, the Tennessee, Alabama & Georgia and the Alabama Great Southern railroads. The Brainard airport is an important station on the nation's great airways system. The Tennessee River is navigable to Chattanooga part of the year.

There is great diversity of manufactures, for over 300 factories make more than 1,200 different articles; principal among these enterprises are steel mills, blast furnaces and textile mills. There are ten banks, one of them a Morris Plan Bank. The city possesses many parks of great beauty and historic interest. The University of Chattanooga offers higher education, and there are three preparatory schools, three business colleges, a public library and six hospitals. The commission form of government was adopted in 1911.

Chattanooga was settled as a military post in 1836, and was first called "The Landing," later changed to "Ross' Landing" in honor of John Ross, a Cherokee chief. In 1839 it was incorporated under the name of Chattanooga. During the Civil War the city was a strategic point of great importance and several important battles were fought here, the most important being the Battle of Chattanooga, the site of which is now occupied by the Chickamauga-Chattanooga National Park (see CHATTANOOGA, BATTLES OF).

The city is situated in the bottom of a great amphitheater, with Lookout Mountain, Sig-



BATTLES OF CHATTANOOGA

Chattanooga, extending from Lookout Mountain along Missionary Ridge for a distance of about twelve miles. To Sherman, Grant assigned the task of attacking the extreme right of the Confederate line and advancing along Missionary Ridge toward the center of their position. General Thomas was to attack the enemy in the center and attempt to dislodge them. General Hooker was to at-

nal Mountain, Missionary Ridge and other heights of less note forming the rim. The scenery is delightful. Population, 1920, 57,895; in 1930, 119,798.

CHATTEL, a term in law nearly synonymous with *personal property* (see *PERSONAL PROPERTY*). Technically, it includes that part of personal property which can be physically delivered and possessed. Certain objects which are a part of real estate may become chattels upon being severed from the real estate, as lumber which has been cut, or ore that has been mined and removed from the land.

CHATEL MORTGAGE. See *MORTGAGE*.

CHAT'TERTON, THOMAS (1752-1770), a boy poet, one of the greatest prodigies in the history of English literature. He pretended to have gained possession of several old manuscripts, and the forgeries which he produced deceived some of the most eminent men of the day, among them Horace Walpole. These so-called "Rowley Poems," some of which possess rare beauty of imagination, are his chief claim to fame. The most remarkable are *The Tragedy of Godwin*, *The Tournament*, *The Parliament of Sprites* and *The Tragedy of Aella*. Chatterton's poems were favorites of Coleridge, Keats, Rossetti and William Morris. The young poet committed suicide in his eighteenth year.

CHAUCER, *chau'sur*, GEOFFREY (1340?-1400), an English poet, known as the "Father of English Poetry." He was by far the greatest verse writer of the fourteenth century, and modern critics give him a place in English literature second only to that of Shakespeare and Milton. Little is known of Chaucer's boyhood or of his education. It is certain that he was born in London, the son of a wine merchant, and probable that he was a page in the palace of Prince Lionel in 1357, later in service of John of Gaunt. During the English invasion of France, in 1359-1360, Chaucer was taken prisoner and ransomed by Edward III. He became a valet, then a squire, in the royal household, and married a lady-in-waiting to the queen. Chaucer's discretion and honesty were undoubtedly valued. Various missions on the continent were entrusted to him, in 1734 he was made comptroller of customs for London and in 1386 he became a member of Parliament. He was, especially during the latter part of his life, very poor, and his poverty was relieved by Henry IV

only a year before Chaucer's death. His connection with court matters and with business matters and his lasting place in literature show that he must have been a man of the greatest versatility.

In the early part of his literary career Chaucer contented himself with translations from the French. He then came under the influence of Italian literature, and this influence shows plainly in such productions as *Troilus and Cryseyde*, *The Legende of Good Women* and *The Parlement of Foules*. In his third and greatest period he was thoroughly English in his theme and in his treatment of it. His masterpiece, *The Canterbury Tales* (which see), was, indeed in its form modeled somewhat after Boccaccio's *Decameron*, in that it comprised the tales of a number of persons. Chaucer's scene, however, is English, his personages are pilgrims who are journeying from the Tabard Inn to the tomb of Thomas à Becket, and the poem gives a marvelous picture of the life of the day in England.

CHAUDIERE, *sho dyair'*, a river of Canada, province of Quebec, which rises on the borders of Maine, near the sources of the Kennebec, and flows into the Saint Lawrence about six miles above Quebec. It is 120 miles long. The banks are steep and rocky. Three miles above the river's junction with the Saint Lawrence are Chaudière Falls, about 120 feet high.

CHAUFFEUR, *sho fer'*, a French word which means, literally, a *stoker*. It has been given a new but somewhat related meaning, and now refers to a person who runs and cares for an automobile, particularly one who serves as a salaried driver. Historically chauffeurs were bands of brigands who pillaged Europe about the year 1793.

CHAUTAUQUA, *sha tawk'wa*, **INSTITUTION**, an organization for the promotion of popular education by means of summer schools and home study. This system is the outgrowth of a Sunday School assembly organized in 1874 at Chautauqua Lake, New York, by the Rev. (later Bishop) John H. Vincent and Lewis Miller. Though the instruction at first was along religious lines alone, the work has developed until now there are fifteen different departments. As many as 15,000 assemble at one time for the sessions. The institution is non-denominational, but thirteen denominations maintain headquarters on the grounds. Many

clubs are in operation such as the Woman's Club, the Bird and Tree Club, the College Club, the Sports Club, and others.

Summer Schools. The system of summer schools was completely worked out under the inspiration of the late Dr. Harper of the University of Chicago, who devoted his summers to the work from 1883 to 1893. There are many courses given during the months of July and August at Chautauqua, embracing instruction in the languages, European and ancient literature, history, pedagogy, science, mathematics, religious training, music, domestic science, arts and

Local Chautauqua. Summer assemblies, reduced now in numbers, are held in different parts of the United States, and are especially popular in rural neighborhoods. Sessions cover several days and are devoted to lectures, concerts and other forms of entertainment.

CHECK, a written order by one person or company upon a bank to pay a certain sum of money to another person. There are therefore three parties to every transaction of this kind: the *drawer* of the check, who must have on deposit at the bank sufficient funds to meet the amount of the check; the *bank*, or the *drawee*, and the *payee*, the one

Chicago, February 27, 1939 . No. 246

THE FIRST NATIONAL BANK OF CHICAGO 2-1

PAY TO THE ORDER OF

Sarah Smalley \$27⁴⁶/₁₀₀

Twenty-seven & ⁴⁶/₁₀₀ Dollars

J. S. Farley

COMMON FORM OF CHECK

crafts, expression and physical education. Professors from leading universities and colleges give instruction, and courses may be taken here for credit in New York University.

Literary and Scientific Circle. This feature of the Chautauqua system is the home reading course. It was organized in 1878. Each course consists of four years of reading (American, English, European and Classical), the work of each year being a complete unit. The courses include history, art, travel, science and literature. Each member of the Circle reads the same books, which are selected by a committee from current publications. Anyone completing a four years' reading course is awarded a diploma. Correspondence work, formerly a feature of the system, has been discontinued. Branches have been organized in Japan and South Africa, and in Canada; in England a home reading system modeled on the Chautauqua plan has been formed.

named in the check to receive the money.

It is estimated that about ninety-five per cent of the balances resulting from commerce are paid by check. The regular use of them for all payments, except of small amount, makes the transfer of funds through banks a mere matter of bookkeeping and tends greatly to economize the use of the precious metals as a currency. Paid checks are returned at intervals to the *drawer*, and thus serve as receipts in the transactions which they represent.

If a check is made payable to *bearer*, any person can cash it; this is an unsafe form of check. If it is payable to *John Jones*, nobody except John Jones can cash it; this is an inconvenient form. If it is payable to *John Jones, or order*, or to the order of *John Jones*, that person can cash it, or he can transfer it to another person by *endorsement*. This consists of a formal order, written on the back of the check, to

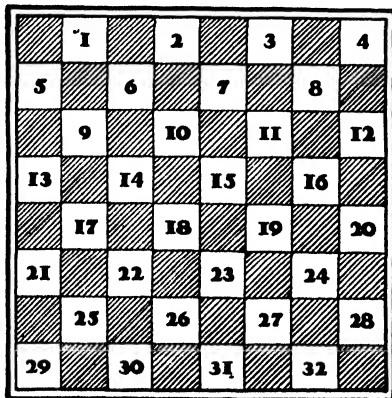
pay to another person the amount named in form as follows:

Pay to order of William Smith.

JOHN JONES.

Checks were first used in 1781, in Venice. See DRAFT.

CHECKERS, a very old game, played with checkers or "men" on a board of sixty-four black and white squares. The figure represents the board, numbered in the usual method for registering games. Two players, each having a set of twelve men—one set white, the other black (or round and square, or distinguished in any other way)—sit opposite each other, having their men arranged on squares 1 to 12 and 21 to 32, respectively. The men can be placed either on the black or white squares, but all must



CHECKER BOARD

be placed on one color only. Whichever color is used, however, the single corners 4 and 29 must be at the player's left hand. The object of the game is to clear off the opponent's men altogether from the board, or so to shut them up that they cannot be moved. Generally the black men play first, and as the men are changed each game, the first move becomes alternate. Each player alternately moves one man at a time diagonally forward, always keeping on the same colored squares. When an enemy's man stands in the way, no move can be made unless there be a vacant square immediately beyond, into which the man can be lifted, in which case the man leaped over is "taken," and removed from the board; and so on, till the game is lost and won, or drawn. When a man on either side has succeeded in making his way to the opposite side of the board, he becomes *crowned*. This is done by put-

ting another man on the top of him, and he can then move in any diagonal direction, but always only one square at a time, except in the taking of the opponent's men.

The game was played in Europe in the sixteenth century, and in 1668 a treatise on the game was published in Paris. The Greeks and Romans had a similar game, and the Egyptians are represented on monuments as engaged in some such amusement.

CHEESE, an important dairy product made principally from the "curds" of milk. There are hard and soft varieties, all of which find a ready market in all civilized countries. Of the soft cheeses, the so-called *cottage* (or *Dutch*) cheese is the variety most easily made. It is prepared from curdled milk which has been heated gently for the purpose of toughening the curds. After the whey is drained off the curd is salted, and sometimes cream is added. *Roquefort* cheese is a soft cheese in which the ripening process is carried to a point at which a blue mold forms through the mixture. Other soft varieties include *Neuchâtel*, *Camembert* and *Limburger*.

The principal hard cheeses are the *Cheddar* (used extensively in the United States and Canada), the English *Cheshire* and *Stilton*, the Dutch *Edam* and *Gouda*, the *Schweitzer* (Swiss) and the Italian *Parmesan* and *Gorgonzola*. The process of making Cheddar cheese is about as follows: Fresh milk is ripened, rennet extract added and stirred in to curdle it, and the milk is held for ten or fifteen minutes at from 82° to 86° F. The whey is afterward separated from the curd, and the latter is cut up, salted, and pressed into desired forms. The molds are then pressed to eliminate any surplus whey, and the product is ripened in a cool place. Cheese made from milk with the butter fat left in is called *full-cream*; when only part of the fat is left the product is called *half-skim*, and when all fat is removed the cheese is called *full-skim*. The latter is hard and leathery, and in some sections its manufacture is illegal.

Cheese is a highly nutritious food, and has a fuel value almost three times that of an equal amount of eggs. It cannot be digested by everybody, but this is true of many other foods. Generally speaking, it is easily digested if properly masticated and eaten in moderate quantities.

Both the United States and Canada are

important cheese-producing countries, and in normal years the latter country exports almost 200,000,000 pounds. Ontario is the chief province in production; in the United States Wisconsin and New York lead.

CHEESE INSECTS, insects which affect cheese. There are two particularly injurious species. The *cheese hopper*, or *cheese skipper*, is a small black fly which deposits its eggs deep in the cracks of cheese, ham and beef. The maggot has two horny, claw-shaped mandibles, with which it digs into the cheese and moves about, as it has no legs. By bringing the two ends of its body together and separating them by a jerk, it can throw itself twenty or thirty times its own length. The other cheese pest is the *cheesemite*, a minute creature which leaves upon the cheese a brown, powdery mass of skins. Scrupulous cleanliness in places where cheese is kept is the best defense against these pests.

CHEE'TAH, or **CHEE'TA**, an animal of the cat family, found principally in Africa and India, and most commonly known as the *hunting leopard*. It derives this name from the fact that it can be trained to hunt antelopes and other like game. The cheetah has a little longer body in proportion to its size than the other cats, and its legs are slender. It can maintain a greater speed for a short distance than can any other mammal.



CHEMISTRY, *kem'is try*; the science which treats of the different kinds of matter in the universe, their properties, laws of combination and relations to one another.

Beginnings of Chemistry. There is another word, the name of what used to be considered a science, which is closely related to the word *chemistry*; it is *alchemy*. One word, in fact, grew out of the other, just as the science of chemistry grew out of alchemy. Just what the name came from has been discussed for very many years; it seems most probable that it was derived from *Chemia*, an old name for Egypt, and that it thus means merely the Egyptian art. This is reasonable enough, for alchemy was first practiced by the Egyptians.

There was another name given to alchemy, a name which had a most unfavorable mean-

ing—the Black Art. The Egyptian priests, with whom the study began, were so mysterious about their researches that people in general got the idea that they must be dealing in magic. And when we remember what it was that the alchemists were trying to do, we do not wonder that they kept it secret. For they were trying to discover a way to change all metals to gold. They never doubted that such a thing could be done—the only trouble was to find the substance with which the base metals had to be treated. They had a name for this wonderful substance, though they could not discover its nature; it was called the Philosopher's Stone.

Sometimes the alchemists wrote out accounts of what they did, for their own use in the future or for the use of other alchemists, but since it was necessary that no outsider should find out about the great secrets which they felt they were always just on the verge of discovering, they set down their records in the most mysterious, ambiguous way possible. This, of course, added to the idea that it was a Black, or Secret, Art.

The Arabs were always interested in sciences, and when, in the seventh century, they invaded Egypt, they took up at once the science which they found there. In the next century an Arab alchemist made some real discoveries. He found a substance that would dissolve gold and he worked out several very important combinations. He also advanced the theory that there were certain elements from which all other substances are made, but he believed that there were only two of these primary substances.

During the Middle Ages alchemy flourished, especially in Spain, where the Mohammedans from Arabia had settled and founded schools. Students from these schools returned to their own countries and taught the science there, and sometimes kings kept alchemists in their service; for why should not a science be popular which had for its object the making of much gold?

But through working towards this end and constantly experimenting, alchemists gained a fund of knowledge about many substances in nature which was very useful. And gradually they came to see that this knowledge might be very useful for at least one purpose—the compounding of medicines. Little by little the original object came to be neglected; men learned enough about gold to

realize that it could not be made of tin or of zinc, and enough of other substances to see that they were valuable in themselves, aside from their possible use as a basis for gold.

In this way the science of chemistry began, and many substances were prepared that were later of great use to chemists. Paracelsus did a great deal for modern pharmacy and medicine in the preparation of drugs. During the seventeenth century alchemy lost its hold on students, and new theories that paved the way for modern thoughts and beliefs were proposed by such men as Boyle, Becher, Stahl and others. Their ideas, though many of them wholly wrong, set men to thinking in the right direction. Black, Priestley, Scheele and Rutherford did important work in the study of gases and made valuable discoveries and separations. Lavoisier, in the latter part of the eighteenth century, was the first to use the balance and to determine substances quantitatively. He was followed by Sir Humphry Davy, Berzelius, Dumas and many modern chemists, all of whom perfected the science as known to-day.

Branches of Chemistry. The science of chemistry is divided into various branches, the most general and important of which are these:

Organic, that division which treats of the carbon compounds. In early times it was thought that every organic compound had a vital principle, as it was called; that is, that it was formed by, or existed in, living plants and animals only. But when Wöhler in 1828 produced an organic compound, called urea, from its elements, this idea began to lose its hold on chemists, and when later other organic compounds were produced artificially, the theory of vital principle was wholly given up. Since all organic compounds contain carbon, the term *organic chemistry* is now defined as the chemistry of the carbon compounds.

Inorganic Chemistry, that division which treats of those compounds that are not united with carbon. The dividing line, however, is not very sharp; for example, carbon dioxide is usually regarded as an inorganic substance, and yet it is a carbon compound.

Some other special divisions of chemistry are:

Agricultural Chemistry, which deals with the problems of the farm and farm products.

Electro-Chemistry, which treats of the use of electricity in chemical problems.

Industrial Chemistry, which is the application of chemical ideas to manufacturing products.

Physical Chemistry, which is that part of the science dealing with physics in its relation to chemistry.

Thermo-Chemistry, which deals with heat changes taking place in chemical reactions.

Chemical Elements. Chemistry divides all substances in the world into two classes: either they are elements or they are compounds. An element is a substance which cannot be divided into two or more simpler substances; a compound is a substance made up of elements. There are in all at the present time about ninety substances which no amount of experimenting, no trying of process after process, has ever reduced to simpler forms; and these ninety we call elements. Of course it may be that some chemist of the future will succeed in breaking up some of these substances; but until this is done they will be considered elements. For a list of important elements, see sub-head below, *Chemical Elements and Symbols*.

Chemical Compounds. The subject of compounds in chemistry is very interesting, for a chemical compound is a different thing from some of the substances we are used to considering as compounds. If you eat a piece of cake you can say at once, "There is sugar in this cake; there is butter, there is flour, and vanilla flavoring; there are eggs." It is *one* thing—a piece of cake; but you think of it instantly as made up of many things; that is, as a compound. But when you taste common salt you have no feeling that it is a compound; when you drink water you are not conscious of drinking *two* things; and yet both of these are compounds.

There is an experiment which is easily tried which will show us something about what a compound in chemistry is. Take a small quantity of very fine iron-filings and mix with them a small quantity of powdered sulphur. No matter how thoroughly you mix them, they are still iron and sulphur; you can tell them apart when you look at them through a microscope, and you can draw out the iron by simply holding a magnet over the mixture. But if you hold an iron spoon containing the mixture over a hot flame, the iron and the sulphur com-

CHEMISTRY

1. The science which treats of the different kinds of matter, their properties, laws of combination, and relations to one another.
2. As a science it is of modern origin.
3. At a very early date it existed as alchemy, the object of which was to discover the philosopher's stone. It led to modern thought and the formulation of a true system.
4. During the time of Lavoisier the names element and compound were correctly applied.

Definition and History

BRANCHES OF CHEMISTRY

- 1. Organic Chemistry.**
 - a. That division which treats of the carbon compounds.
 - b. In early times it was thought that every organic compound had a vital principle, existing in living plants and animals only.
 - c. This theory was abandoned when organic compounds were produced artificially by Wohler and others.
- 2. Inorganic Chemistry.**
 - a. That division which treats of those compounds that are not united with carbon.
 - b. The dividing line not very sharp. Carbon dioxide is usually regarded as an inorganic substance, and yet is a carbon compound.
- 3. Agricultural Chemistry.**

Deals with farm problems and farm products.
- 4. Electro-Chemistry.**

Treats of the use of electricity in chemical problems.
- 5. Industrial Chemistry**

The application of chemical ideas to manufacturing products.
- 6. Physical Chemistry.**

That part of the science dealing with physics in its relation to chemistry.
- 7. Thermo-Chemistry.**

Deals with heat changes taking place in chemical reactions.

PRINCIPLES OF CHEMISTRY

- 1. Element.**

An element is a substance which cannot be separated into two or more different substances molecules that contain but one kind of matter, such as arsenic, carbon. In 1906 seventy-seven elements were known.
- 2. Compound.**

A compound is a substance composed of two or more substances, such as water. The force which holds together the elements in the form of compounds is called chemical affinity.
- 3. Laws of Combination.**
 - a. Chemical combination takes place between molecules when very close together, when in solution or melted together.
 - b. Chemical combination always effects a change in all bodies.
 - c. Chemical combination takes place with different degrees of force in different bodies.
 - d. Chemical combination is much affected by such forces as heat, light, electricity and mechanical force.
 - e. All substances, elementary and compound, combine in fixed and definite proportions by weight.
 - f. When bodies combine in more than one proportion, their other combining proportions are simple multiples of the lowest.
 - g. Gases combine in fixed and definite proportions by volume as well as by weight.
 - h. The combining proportions of compounds are the sum of the combining proportions of their constituent elements.

Boyle, Faraday, Gay-Lussac, Lavoisier, Liebig,
Sir Humphry Davy, Berzelius, Batson, Dumas,
Pasteur, Priestley, Black, Rutherford.

GREAT CHEMISTS

bine to make something which is neither iron nor sulphur; in fact, it is not like either iron or sulphur. If you pound the new substance to a powder, you will find that you cannot separate the iron from the sulphur now even with the strongest of magnets. That is, the two have formed a new substance which is just as real and has just as distinct properties of its own as the two original substances. But there is one difference: if you know the proper chemical means to decompose the new substance, you may get back your iron and sulphur, while neither of the original elements could have been divided by any means.

Such a mixture as that of the iron and the sulphur before they were heated is called a *mechanical mixture*; such a substance as that formed by the heating is called a *chemical compound*. Now many of the things we have in commonest use which we are used to thinking of as simple as anything could well be, are such chemical compounds. Water is such a compound; salt is another.

Atoms. What can we find out about the way those compounds which do not seem like compounds are made up? To begin with, recent scientific research has revealed to us that the atom, which was conceived as the smallest particle of an elementary substance, has a system of its own, although preserving its identity in chemical combinations as an *atom*. In every atom is a central *nucleus* of *positive electrons*, around which revolve *negative electrons*. Scientists tell us that the number and arrangement of these electrons determine the nature of the element.

Chemically how do atoms function? Now when a certain number of atoms of one element are brought close to a certain number of atoms of another, various things may happen. The two kinds of atoms may show not the slightest interest in each other, both remaining exactly as before; one atom of one kind may seize upon one or more atoms of the other substance and unite to form a tiny particle of a new substance; or both kinds of atoms may wait until some outside force, like electricity or heat, puts them in such a condition that they can unite. Atoms which unite with each other, either unaided or with the help of some outside force, are said to have a *chemical affinity* for each other. Unless the atoms of two substances have this chemical affinity, no amount of mixing or heating or fusing will

make of them anything but a mechanical mixture.

In the very simplest form of chemical compound, one atom of one substance combines with one atom of another. But often one atom of one element will seize upon two or three or even four of another; or two atoms of one may unite with three of another.

Some of the eighty or more elements of which we know are gases; some are metals, some are solids other than metals, and one is a liquid. Naturally we are better acquainted with the solids than we are with the gases, because such things as gold, iron, lead, silver, sulphur and tin we see about us every day, while chlorine, fluorine and argon must remain little more than names to us until we come to the systematic study of chemistry.

Names in Chemistry. The names that have been given to the different elements sometimes owe their origin to mythology, or to some property they possess. No one system has been used. In modern times it is the custom to give metals a name ending in *um*, as radium, potassium. In choosing names for compounds, the aim has been to express the composition as far as possible. Thus: sodium chloride, a compound of sodium and chlorine. If more than one atom of chlorine, for example, is present in a compound, it is called a *bichloride* or *trichloride*, depending on the number of chlorine atoms. To denote a combination of an element with oxygen, the name *oxide* is used, as calcium oxide. In general, when there are two oxides of an element, the name of the element ends in *ous* when there is less oxygen; and *ic* when there is more oxygen. Thus, ferrous oxide and ferric oxide are used to express the oxides of iron having, respectively, less and more oxygen. This termination in *ous* and *ic* also applies to other compounds of elements, such as salts and acids. A salt derived from an *ous* acid, has a name ending in *ite*; one from an *ic* acid, a name in *ate*; thus, a salt from *sulphurous* acid is called a *sulphite*; from *sulphuric* acid, a *sulphate*.

Chemical Elements and Symbols. Chemists have a way of naming chemical compounds which shows at once that they are such compounds, and shows the elements of which they are composed. Each element has what is called a *symbol* by which it is known—usually the first letter of its name: thus O stands for oxygen, H for hydrogen

Wonder Questions in Chemistry

What is the most costly substance known?

It costs more to buy radium than any thing else on the globe. A fine glass tube of radium about an inch long is worth \$4,000, and a pound of this element is valued at nine million dollars.

Why is carbonic acid gas poisonous to the lungs but harmless when taken in soda water?

Our lungs need oxygen to enable us to breathe. Since animals cannot separate oxygen from carbonic acid gas when the two are united in a compound, air containing a large proportion of the latter is unfit to breathe and causes suffocation. Water charged with this gas effervesces and froths and is a pleasant and stimulating drink.

Why does fanning a flame make it burn more intensely?

By stirring up the air one supplies the flame with more oxygen, and oxygen is the essential element in combustion, or burning. If air be excluded from a fire the flame will die out.

What is the purest form of water known?

Fresh rain water is purer than any other kind, because rain is condensed water vapor which falls from the clouds. The water vapor is taken into the air by means of evaporation, and evaporation is nature's way of distilling water. In the process impurities are eliminated.

What is the lightest substance in nature?

Hydrogen weighs less than any other substance. A pint of this gas weighs between one five-hundredth and one six-hundredth of an ounce. A pint of water weighs 11,500 times as much as an equal amount of hydrogen.

What causes the blue flame one sees in a coal fire?

Carbon, the principal element in coal, gives rise to carbon monoxide when it combines with oxygen. Carbon monoxide is a colorless gas, but it burns with a blue flame which can easily be seen among the burning coals.

Why do gases expand more readily than liquids?

In a liquid the molecules are much closer together than in a gas. The molecules of a gas are so far apart that they do not exert any attractive force upon one another. Thus the gas has no definite volume and is constantly changing.

What is the relation between a diamond, graphite and charcoal?

These three substances are forms of carbon. They appear different to the eye because of the difference in the arrangement of their molecules.

What is ozone?

Ozone is an active and concentrated form of oxygen. If three units of oxygen are condensed into two, they will become ozone. Ozone is changed into ordinary oxygen by the action of heat. The pure air of the country districts contains a larger proportion of ozone than city air.

In what respect does mercury differ from all other metals?

It is the only liquid metal known. Like water, it may be converted into vapor by boiling, and it may be solidified by applying cold. In countries far to the north the mercury in thermometer tubes sometimes freezes.

What is meant by the term noble metal?

This term is applied to metals that do not tarnish, such as gold and platinum. They resist tarnishing because they are not readily attacked by the air and its gases.

Why is aluminum a good metal for making cooking utensils?

It is light, not easily tarnished, and resists the action of animal and vegetable juices which would corrode certain other metals.

Do chemical compounds ever vary in weight?

A given chemical compound has a definite composition by weight, and always contains the same elements in the same proportions by weight. Scientists have performed countless experiments and have never found an exception to this rule.

and N for nitrogen. And when it is desired to express a chemical compound, the letters which stand for the elements of which it is composed are written together, thus NO would mean a combination of nitrogen and oxygen. But this is not enough. *Two* atoms of one element combine with one or with three of another element. This also must be shown, and for this purpose small figures, written to the right of and below the letters, are used. For instance, H_2O means that two atoms of hydrogen combine with one atom of oxygen to form some sort of a compound. In this case, the compound is water.

In the list of the elements which follows, the letter or letters after the name represent the symbol of the element:

NAME	SYMBOL	NAME	SYMBOL
Aluminum	Al	Mercury	Hg
Antimony	Sb	Molybdenum	Mo
Argon	A	Neodymium	Nd
Arsenic	As	Neon	Ne
Barium	Ba	Nickel	Ni
Beryllium	Be	Nitrogen	N
Bismuth	Bi	Osmium	Os
Boron	B	Oxygen	O
Bromine	Br	Palladium	Pd
Cadmium	Cd	Phosphorus	P
Calcium	Ca	Platinum	Pt
Carbon	C	Potassium	K
Cerium	Ce	Praseodymium	Pr
Cesium	Cs	Radium	Ra
Chlorine	Cl	Radon	Rn
Chromium	Cr	Rhodium	Rh
Cobalt	Co	Rubidium	Rb
Columbium	Cb	Ruthenium	Ru
Copper	Cu	Samarium	Sa
Dysprosium	Dy	Scandium	Sc
Erbium	Er	Selenium	Se
Europium	Eu	Silicon	Si
Fluorine	F	Silver	Ag
Gadolinium	Gd	Sodium	Na
Gallium	Ga	Strontium	Sr
Germanium	Ge	Sulphur	S
Gold	Au	Tantalum	Ta
Hafnium	Hf	Tellurium	Te
Helium	He	Terbium	Tb
Holmium	Hm	Thallium	Tl
Hydrogen	H	Thorium	Th
Indium	In	Thulium	Tm
Iodine	I	Tin	Sn
Iridium	Ir	Titanium	Ti
Iron	Fe	Tungsten	W
Krypton	Kr	Uranium	U
Lanthanum	La	Vanadium	V
Lead	Pb	Xenon	Xe
Lithium	Li	Ytterbium	Yb
Lutecium	Lu	Yttrium	Y
Magnesium	Mg	Zinc	Zn
Manganese	Mn	Zirconium	Zr

New elements of recent discovery, which complete the periodic table, are: Masurium and Rhenium; Illinium; Polonium; Eka-Iodine; Eka-Cesium, discovered by the

spectroscope and named Virginium; Actinium; and Eka-Tantalum or Uranium (X).

Chemistry an Experimental Science. Once we have really grasped the idea of the combining of atoms and the system of the naming of chemical compounds, we have the foundation principles of chemistry; all the rest is really variations of the same theme. But these variations are endless, or so nearly so that we can make not even a beginning of discussing them here. Chemistry is emphatically an experimental science, and no exhaustive knowledge of it can be gained without the making of experiments. Unlike experiments in physics, chemical experiments cannot well be performed at home, by an inexperienced person, as the substances dealt with are in many instances dangerous.

Related Articles. Consult the following titles for additional information:

Acetic Acid	Fermentation
Acetylene	Fulmination
Acid	Gas
Affinity	Gelssler's Tubes
Air	Glauber's Salt
Albumen	Glycerine
Alchemy	Helium
Alcohol	Hydrates
Alkali	Hydrocarbons
Alkaloid	Hydrochloric Acid
Allotropy	Hydrofluoric Acid
Alloy	Hydrogen Dioxide
Alum	Iodoform
Alumina	Lime
Aluminum	Liquid Air
Ammonia	Litmus
Analysis	Lunar Caustic
Aniline	Magnesia
Antidote	Metals
Atomic Theory	Molecule
Atomic Weights	Natural Gas
Base	Nitrate
Blue Vitriol	Nitric Acid
Borax	Nitroglycerine
Brimstone	Oxalic Acid
Bromides	Oxidation
Calcium Carbide	Ozone
Carbohydrate	Phosphates
Carbolic Acid	Phosphoric Acid
Carbon	Picric Acid
Carbonates	Potash
Carbon Disulphide	Prussic Acid
Carbonic-acid Gas	Putrefaction
Carbon Monoxide	Reactions
Carborundum	Rust
Caustic	Sal Ammoniac
Chloroform	Salicylic Acid
Cinnabar	Salt
Citric Acid	Saltpetre
Coal Tar	Silica
Combustion	Soda
Copperas	Solution
Corrosive Sublimate	Spontaneous Combustion
Cream of Tartar	Stearic Acid
Creosote	Stearin
Crystallization	Sulphates
Cyanogen	Sulphureted Hydrogen
Decomposition	Sulphuric Acid
Dextrin	Tannin
Diffusion	Tartaric Acid
Distillation	Water
Electro-chemistry	Wood Alcohol
Electrolysis	

CHEMISTS

Bunsen, Robert W. E.	Faraday, Michael
Curie, Pierre and Marie	Gay-Lussac, Louis J
Skłodowska	Liebig, Justus
Crookes, Sir William	Pasteur, Louis
Davy, Sir Humphry	Remsen, Ira

CHEMNITZ, *kem'nits*, GERMANY, the principal manufacturing town in the state of Saxony, on the Chemnitz River, thirty-eight miles southwest of Dresden. The cities of Leipzig and Dresden, also in Saxony, are larger, but Chemnitz excels both of them in the extent of its manufactures. Here are vast locomotive works and textile and woolen mills, and the city is a German center for the manufacture of gloves and hosiery. Its chemical works have been world famous for a hundred years. There are many institutions for higher education. Population, 1933, 350,750.

CHENILLE, *she neel'*, a sort of ornamental fabric, of cordlike form, made by weaving or twisting together warp threads with a transverse filling, or weft, the loose ends of which project all around in the form of a pile. Chenille carpets have a weft of chenille, the loose threads of which produce a fine velvety pile.

CHEOPS, called **KHUFU** by the Egyptians, the ruler of Egypt about 2500 B. C. He built the Great Pyramid, and it is said that he employed 100,000 men for twenty years in its construction. Some of the problems connected with the task have not been solved by modern builders. See **PYRAMID**.

CHERBOURG, *sher boor'*, FRANCE, a city and fortified seaport at the mouth of the Divette River, on the English Channel, eighty-two miles west by north of Havre. Among the chief buildings are the Church of Sainte Trinité and that of Saint Clement, the Hotel de Ville, the Marine Library, a museum and a theater. The importance of Cherbourg is due to its immense defensive and naval works. These engineering works are among the most gigantic of their kind in ancient or modern times. The commercial port consists of a harbor and a basin about 1,300 feet long and 1,400 feet wide, and is connected with the sea by a channel about 2,000 feet long and 164 feet wide, lined with granite docks with parapets. The military port, which can accommodate forty vessels of war, has three basins, is entirely cut out of solid rock and has a length of about 930 yards and a breadth of 437 yards.

Cherbourg is also celebrated for its great breakwater, or *digue*, stretching across the harbor, which is protected on three sides by land, but is open to the sea on the north. It is two and one-fourth miles from the harbor. At the meeting of the two branches

of the breakwater is a central fort or battery measuring 509 feet. Population, 1931, 45,000.

CHEROKEE. This, the largest and most important of the Indian tribes east of the Mississippi, was of Iroquoian descent, but separated into two great groups. The Upper Cherokee lived in log huts along the headwaters of the Tennessee and Cumberland rivers, where they cultivated corn, beans and pumpkins in abundance. The Lower Cherokee were wanderers and existed principally by hunting. Throughout the Revolution they sided with the British, but after the establishment of the new government they acknowledged the sovereignty of the United States. The Cherokee proved a teachable race, intermarried freely with Scotch refugees and became Christianized and educated. In 1827 they organized the Cherokee nation. George Guess, or Sequoyah, invented an alphabet from which many books were printed in their language.

One of the inexcusable cruelties of history was the treatment the Cherokee received from Georgia, which wanted their lands, and by aid of the United States troops drove the Indians out of the state. After a terrible march, the Cherokee finally settled in the Indian Territory, where, under their famous chief, John Ross, they again set up their government at Tahlequah. The Civil War again brought them in conflict with both the Confederate and Union armies, and it was only with the greatest difficulty that they preserved their independence. These Indians are refined and are in appearance scarcely distinguishable from the whites, among whom they now are classed as citizens of the United States. They number about 20,000. See **FIVE CIVILIZED TRIBES**.

CHERRY, a tree belonging to the same family as the plum and the prune, whose small round, usually red fruit is a table delicacy. There is also a species of black cherry. The cherry blossom of early spring, a white flower with pink center, is famous in song and legend; particularly does it add to the charm of Japan, "the land of cherry blossoms."

American production is greatest in California, which raises twelve per cent of the total crop of about 4,200,000 bushels; Pennsylvania, Ohio and Michigan are next in quantities grown. The value of the yearly crop is about \$7,250,000. In Southern

Canada cherries are grown, but not in large quantities.

The wood of the tree is fine grained and dark and takes a high polish. It serves a valuable purpose in the making of high-grade furniture.

CHERRY LAUREL, the common name of an evergreen shrub, a native of Asia Minor, but now naturalized in America and common in shrubberies. It is commonly called laurel, but it must not be confounded with the sweet bay or other true species of laurel. The leaves yield an oil nearly identical with that from bitter almonds, but less dangerous to use.

CHERRY VALLEY MASSACRE, a massacre perpetrated in the village of Cherry Valley in central New York, by 700 British, Tories and Indians, December 10, 1778. The attack was made at night and without warning, and about fifty inhabitants were murdered, including women and children. This episode and that of the Wyoming Valley Massacre led to the expedition of General Sullivan through New York in the following year. See REVOLUTIONARY WAR.

CHERUB, a word derived from the Hebrew word *to know*, and applied to one of a heavenly order of beings who are supposed to excel in knowledge. Cherubim rank next to seraphim among the angelic orders. In art they are generally depicted as heads with one, two or three pairs of wings. Among the most famous cherubim in art are those which form the clouds in the background of Raphael's *Sistine Madonna*. Perugino's *Assumption of the Virgin* and Murillo's painting of the same name also contain beautiful representations of these heavenly beings.

CHESAPEAKE, THE, a vessel famous in the history of the American navy. It was built early in the nineteenth century and in 1807, under the command of Commodore James Barron, started across the Atlantic on a training cruise. It was overtaken and halted by the *Leopard*, a British frigate, whose purpose was to demand the return of British deserters who were alleged to be among the *Chesapeake's* crew. Barron refused to accede to this demand, and his vessel was attacked. After a brief but vigorous action the *Chesapeake* was forced to surrender, and four sailors were taken aboard the British vessel. The American government immediately demanded reparation from

England, but none was forthcoming. This incident, which was known as the "*Chesapeake* affair," was one of the chief events which led to the War of 1812.

During the War of 1812, on June 1, 1813, the *Chesapeake*, commanded by Captain James Lawrence, fought a battle with the British vessel *Shannon* in Massachusetts Bay. Again the *Chesapeake* was forced to surrender, its captain being mortally wounded. During his last hours he encouraged his men with the cry, "Don't give up the ship," which has since been a stirring slogan in the American navy. The *Chesapeake* was taken to Halifax and afterwards was made into a British man-of-war, but was demolished in 1820.

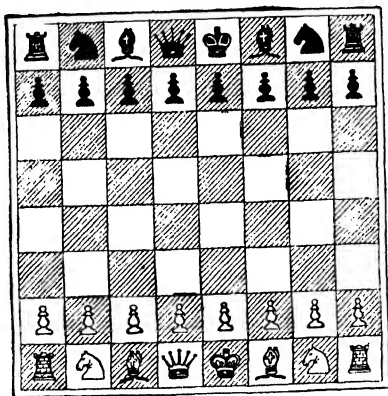
CHESAPEAKE, *ches'a peek*, AND OHIO CANAL, a canal extending from Georgetown, D. C., now a part of the city of Washington, to Cumberland, Md. It is 184.5 miles long, sixty feet wide and six feet deep, and it has seventy-four locks, with a total lift of 609 feet. It was completed in 1850. This canal follows the course of the Potomac River and was for years an important artery of trade; it is now little used.

CHESAPEAKE BAY, a very important arm of the Atlantic Ocean, entering the states of Virginia and Maryland and dividing the latter into two parts. Its length is 200 miles; its width is from ten to forty miles, and its depth is from twenty to sixty feet. The entrance between Cape Charles and Cape Henry is twelve miles wide. The coasts are irregular, and some of the largest inlets are estuaries of large rivers, such as the York, James, Potomac and Susquehanna. The bay is navigable its entire length for the largest steamers, and Norfolk and Baltimore are important ports for both inland and foreign trade. The bay is noted for its extensive oyster beds; the Chesapeake oyster fisheries are the most extensive of any in the United States, Long Island Sound ranking second. Most of the annual catch of 20,000,000 bushels yearly in the Middle Atlantic states is from this bay.

CHESS, a well-known game, of great antiquity and of Eastern origin, having probably arisen in India and thence spread through Persia and Arabia to Europe. It is probably the slowest of all games to play, and the one requiring deepest thought.

The game is played by two persons on a board, which consists of sixty-four squares.

arranged in eight rows of eight squares each, alternately black and white. Each player has sixteen men, eight of which, known as *pawns*, are of the lowest grade; the other eight, called *pieces*, are of various grades. They are, on each side, *king* and *queen*, two *bishops*, two *knight*s and two *rooks*, or *castles*. The board must be placed so that each player shall have a white square at his right hand. The men are then set upon the two rows of squares next the players, the pieces on the first, the pawns on the second, row, leaving between the two sides four unoccupied rows. The king and queen occupy the central squares facing the corresponding pieces on the opposite side. The queen always occupies her own color, white queen on white square, black on black. The two bishops occupy the squares next the king and queen; the two knights the squares next the bishops; the castles, or rooks, the last, or corner, squares. The pawns fill the squares of the second, or front, row (see accompanying diagram).



CHESS BOARD
Men in Opening Position.

The men standing on the king's or queen's side of the board are named respectively king's and queen's men. Thus king's bishop or knight is the bishop or knight on the side of the king. The pawns are named from the pieces in front of which they stand; king's pawn, king's knight's pawn, queen's castle's pawn, etc. The names of the men are contracted as follows: King, K.; King's Bishop, K. B.; King's Knight, K. Kt.; King's Castle, K. C. or K. R.; Queen, Q.; Queen's Bishop, Q. B.; Queen's Knight, Q. Kt.; Queen's Castle, Q. C. or Q. R. The

pawns are contracted: K. P., Q. P., K. B. P., Q. Kt. P., etc. The board is divided, inversely from the position of each player, into eight rows and eight files. Counting from White's right hand to his left, or from Black's left to his right, each file is named from the piece which occupies its first square, and counting inversely from the position of each player to that of the other, the rows are numbered from 1 to 8. At White's right-hand corner we have thus K. R. square; immediately above this K. R. 2; and so on to K. R. 8, which completes the file; the second file begins with K. Kt. square on the first row, and ends with K. Kt. 8 on the eighth. White's K. R. 8 and K. Kt. 8 are thus Black's K. R. square and K. Kt. square, and the moves of each player are described throughout from his own position, in inverse order to the moves of his opponent.

In chess a man captures by occupying the position of the captured man, which is removed from the board. The ordinary move of the *pawn* is straight forward in the same file; a P. never moves backward. The first time a pawn is moved it may be played forward one square or two; afterward only one square at a time. But in capturing an adverse piece the pawn moves diagonally to occupy the position of the captured man. When a pawn reaches the eighth row it can no longer remain a pawn, but must at once be exchanged for a piece. The player may choose any piece except the king, but the queen, the most valuable piece, is generally the piece chosen. This is called *queening a pawn*, and the player may thus have several queens on the board. The *rook*, or *castle*, moves in any direction and for any distance that is open, along either the particular row or the file on which it happens to stand. It can, of course, capture any obstructing man and occupy its place. The *bishop's* moves, like the *castle's* are unlimited in range and are either backward or forward, but their direction is diagonal, and any bishop must always occupy squares of the same color. The *queen* combines the moves of the *castle* and the *bishop*. She is the most powerful piece on the board and can move in any direction or to any distance in a straight line. The *king* is at once the weakest and most valuable piece on the board. In point of direction he is as free as the queen, but for distance he is limited to the adjacent squares. Standing on any central square, he

commands the eight squares around him, and no more. Besides his ordinary move the king has another by special privilege, in which the castle participates. Once in the game, if the square between king and castle are clear, if neither king nor castle has moved, if the king is not attacked by any hostile man and if no hostile man commands the square over which the king has to pass, the king may move two squares towards either king's castle or queen's castle, and the castle at the same time may move to the square over which the king has passed. This is called *castling*. The *knight*, unlike the other pieces, never moves in a straight line. His move is limited to two squares at a time, one forward or backward, and one diagonally, and he can leap over any man occupying a square intermediate to that to which he intends to go. The knight, like the king, when on a central square commands eight squares, but they are at two squares' distance, and all in an oblique direction. All captures in chess are optional.

The definite aim in chess is the reduction to surrender of the opposing king. The king in chess is supposed to be inviolable; that is, he cannot be taken, he can only be in such a position that if it were any other piece it would be taken. Notice of every direct attack upon him must be given by the adversary saying "check" and when the king is attacked all other plans must be abandoned and all other men sacrificed, if necessary, to remove him from danger, cover the attack or capture the assailant. It is also a fundamental rule of the game that the king cannot be moved into check. When the king can no longer be defended on being checked by the adversary, either by moving him out of danger, or by interposing or by capture, the game is lost, and the adversary announces this by saying "checkmate." When, by inadvertence or want of skill, the player having the superior force blocks up his opponent's king so that he cannot move without going into check, and no other man can be moved without exposing him, the player, reduced to this extremity, cannot play at all. In such a case, the one player being unable to play and the other being out of turn, the king is *stalemated* and the game is considered *drawn*, that is, concluded without advantage to either player.

CHEST, or THORAX, the cavity of the human body which lies between the neck and the abdomen. It is bounded by the ribs, sternum and diaphragm and that portion of

the spinal column to which the ribs are attached. It is conical in shape, with the apex upward, and contains the heart, lungs, great arteries, veins and nerves, the trachea, bronchi, oesophagus and thoracic duct. The organs of the chest are subject to many diseases, some of which are frequently fatal. Those diseases most to be dreaded are diseases of the heart, and asthma, consumption, bronchitis and pneumonia.

CHESTER, ENGLAND, a river port, capital of Cheshire, situated on the right bank of the Dee, sixteen miles southeast of Liverpool. It is one of the oldest cities of England and still has many traces of early periods. There are around the city ancient walls of sandstone, which surround it for a circuit of two miles, forming beautiful promenades. The streets, which were hewn out of rock by the Romans at a depth of from four to ten feet, are a very interesting feature of the town; they are called *rows*. Among the chief buildings are the Chester Cathedral, several other fine churches and a portion of a castle founded by William the Conqueror. The River Dee is here crossed by three bridges, the most noteworthy of which is Grosvenor Bridge, a splendid stone structure 200 feet in length. The principal trade is in cheese, for which Chester for a century has been especially celebrated. Population, 1931, 41,438.

Chester Cathedral, a beautiful structure of sandstone, built in Norman Gothic style. It is cruciform, and has a tower 127 feet high. The cathedral has an especially beautiful choir, 125 feet in length, and its charm is increased by the magnificent carved wooden stalls, which are unrivaled elsewhere in England.

CHESTER, GEORGE RANDOLPH (1869-1924), an American writer of humorous and spirited stories of modern life. The best known of these is the *Get-Rich-Quick-Wallingford* series, which proved as popular on the stage as in book form. Chester was born in Ohio. He began his career as a reporter for the *Detroit News*, and subsequently became Sunday editor of the *Cincinnati Enquirer*. Eventually he became one of the best-known magazine writers in America. Underneath the fun and adventure in his stories one always finds real pictures of human nature. Chester's works, besides the Wallingford series, include *Cor-delia Blossom*, *A Cash Intrigue*, *The Mak-*

ing of *Bobby Burnit*, *Five Thousand an Hour* and *The Enemy*.

CHESTER, PA., the oldest town in the state, was settled in 1644 and until 1682 was called Upland. In the latter year it was given its present name, in honor of Chester, England. It is in Delaware County, fourteen miles southwest of Philadelphia, on the Baltimore & Ohio, the Pennsylvania and the Philadelphia & Reading railroads. The old city hall was built in 1724, and one of the homes of William Penn is here. There are manufactures of cotton, woolen and silk goods, locomotives, electrical supplies, an automobile assembly plant, oil refineries, and ship-building plants. There is mayor and council government. Population, 1920, 58,030; in 1930, 59,164.

CHESTERFIELD, PHILIP DORMER STANHOPE, Earl of (1694-1773), an English statesman and author. His letters to his son, written to form the manners of the young man, combine wit and good sense with knowledge of society. The writer himself had such distinguished manners that his name is even now associated with good breeding. Chesterfield succeeded his father in the title in 1726, sat in the House of Lords and acquired some distinction as a speaker. In 1728 he was ambassador to Holland, in 1744 lord lieutenant of Ireland, a position which he occupied with great credit, and in 1746, secretary of state. Two years later, however, he retired from public affairs and lived as an English gentleman.

CHESTERTON, GILBERT KEITH (1874-1936), one of the foremost English writers of his day, widely known as a poet, essayist and novelist. He studied at Saint Paul's School and at the Slade Art School, beginning his literary career by writing for various London newspapers and magazines. His unusual style and quickness of wit, and above all his extreme fondness for paradox quickly brought him into public notice, and he has found a wide circle of admirers among thoughtful readers. In 1900 he brought out two volumes of verse—*The Wild Knight* and *Greybeards at Play*. These were followed by a number of books, including critical biographies of Browning, Watts, Dickens and Shaw; several volumes of essays, represented by *Heretics* and *Orthodoxy*; and a number of stories, including the *Father Brown* series, *Manalive* and *The Flying Inn*. In 1913 his play, *Magic*, was produced.

CHESTNUT, *ches'nut*, a genus of trees allied to the beech, which had its origin in Italy. The common, or *Spanish*, chestnut is a stately tree, with large, handsome, dark green leaves. The fruit consists of two or more seeds, enveloped in a prickly husk. Probably a native of Asia Minor, it has long been naturalized in Europe and was perhaps introduced into Britain by the Romans. The



CHESTNUT BURS
AND LEAVES

tree grows freely in the United States and may reach the age of many centuries. Chestnuts form a staple article of food among the peasants of Spain and Italy. The timber of the tree was formerly more in use than it is now. It is inferior to that of the oak, though very similar to it in appearance, especially when old. Two American species of chestnuts have edible fruits. One is often regarded as identical with the European tree. The name of *cape chestnut* is given to a beautiful tree of the rue family, a native of the Cape of Good Hope. See HORSE-CHESTNUT.

CHEVIOT, chev'iut, HILLS, a range of low mountains between England and Scotland, about thirty-five miles long, extending from the sources of the Liddel to the River Tweed. The hills are grass-covered and furnish pasturage for large flocks of sheep. Grouse are plentiful. The hills were long the scene of Border warfare and of the romance connected with it. Here occurred the conflict between Hotspur and Douglas immortalized in the most famous of English ballads, *Chevy Chase*.

CHEVRON, chev'run, a distinguishing mark on the sleeve of the coat to indicate non-commissioned rank in armies. It consists of bars meeting at an angle. In the United States army the lowest non-commissioned office, that of corporal, the chevron consists of two bars; a sergeant has three bars; a first sergeant, three bars and a lozenge. See INSIGNIA.

CHEWING GUM, a plastic, insoluble substance made of chicle or spruce gum, and

intended for continued mastication. To render it pleasant to the taste it is usually sweetened with wintergreen, spearmint or other essence of agreeable flavor. The chewing-gum habit, obnoxious to the majority of people, has grown to enormous proportions in America. It was little known in England prior to the World War, but American and Canadian soldiers found it immensely useful on the march in allaying thirst, and the habit was soon widely adopted by Europeans. Before the war an American manufacturer had spent a vast sum in England to encourage gum-chewing, but without success.

America's thirty-five factories produce chewing gum to the total value of about a million dollars every week, most of which finds its market at home, though there is some export demand. Chicle, its base, comes largely from Yucatan (see CHICLE).

CHEYENNE, *shi en'*, or *she en'*, a brave and manly tribe of plains Indians of Algonquian stock. Originally they were agriculturists, living in settled villages, but when they obtained horses they became expert riders and gave up their settled habitations. It would seem that so intelligent and powerful a race might have been civilized, if decently treated, but they became the fiercest enemies of the whites, and the terrible cost of subduing them can never be estimated. At present about 1,200 are living peacefully on a reservation in Arizona, while about 2,000 more are living among the whites in Oklahoma.

CHEYENNE, *shien'*, Wyo., founded in 1867, is the county seat of Laramie County and since 1869 has been the capital of the state. It is situated 106 miles north of Denver, Colo., on the Union Pacific, the Chicago, Burlington & Quincy, and the Colorado & Southern railroads. It is on a plateau more than 6,000 feet above the sea. The city has 160 acres in parks, a waterworks system costing about \$2,000,000, Union Pacific railroad shops, a Carnegie Library, a Federal building and the state Capitol. The Cheyenne airport is one of the most modern in the United States; it employs more than 400 people. There are four parks and two libraries. The city is the originator of the Frontier Days' Wild West celebration, which is held annually and attracts thousands of people. The commission form of government provides for a mayor and two commissioners. Population, 1930, 17,361.



CHICAGO, ILL., the world's largest lake port and its fifth city in population, situated at the head of Lake Michigan, on its southwestern shore, and on the Chicago River. It is in Cook County, of which it is the county seat. The site of this great city, whose marvelous growth has been crowded into less than a century, is considerably east of the center of the country, for Chicago is 911 miles from New York and 2,274 miles from San Francisco. It was

thus well located to become the "metropolis of the Middle West", a title that it deserves not only in respect to population, but in regard to commerce, communication, wealth and industry.

The historian of this city usually begins his story with some reference to its rapid growth, for in this respect Chicago holds a record never before equaled. Almost within the memory of living men it was a pioneer trading post on an unattractive, marshy site. In the year 1840, seven years after it was incorporated as a town, it contained 4,479 inhabitants. In the next half century the population figures went over the million mark to 1,099,850, and within the next two decades the two-million mark was passed. The census of 1910 gave the city a population of 2,185,283; in 1920, it was 2,701,705; in 1930, 3,376,438. It has thus outdistanced scores of Old World cities, besides Boston, Detroit, Los Angeles and Philadelphia, and is surpassed in the western hemisphere only by New York.

General Description. Chicago was originally built on flat prairie land only a few feet above the lake level, but between 1855 and 1860 the grade of a large portion of the site was raised ten feet or more, to provide a more secure foundation for building purposes. Though lacking in picturesque landscape features, the site was redeemed by the lake, along which the city now extends for twenty-six miles. Commercial and industrial Chicago extends along the lake front from Waukegan, Ill., to Gary, Ind., a distance of sixty miles. Three and a half million inhabi-

tants live within this city of about 200 square miles, and it is in no sense a densely-crowded city. There are congested sections, it is true, but in the outlying districts there are still many open spaces. Chicago has space in which to grow, even without annexing the scores of populous suburbs that enclose it on the north, south and west.

The small Chicago River, with its northwest and southwest branches, divides the city into three districts called the North, West and South sides. In the downtown section of the South Side are the chief office buildings, banks, retail stores, theaters and hotels. The various branches of the elevated transportation system pass around the business district, forming the "Loop," and by that name the busiest section of the city is commonly known. It is here that congestion becomes serious, as tens of thousands of workers daily pour into the comparatively small area, besides an endless succession of surface cars, automobiles, trucks and busses. The shopping district, too, is within the Loop, for the great retail department stores, for which Chicago is famous, are all grouped on two sides of State Street, the main business thoroughfare. These stores—Marshall Field & Co., Mandel Brothers, Stevens Brothers, Carson, Pirie, Scott & Co., the Davis Company, The Fair, The Boston Store, and The Hub—form the largest group of their kind in the world.

State Street is the third street west of the lake front between Randolph Street on the finest promenades in the world, Michigan Boulevard, bounding what is known as Grant Park, is the first street west of the lake. Grant Park comprises that portion of the lake front between Randolph Street on the north and Park Row on the south, about a mile in extent. Along the west side of the boulevard there extends a row of buildings of varied and impressive architecture, including the Stevens, Blackstone, and Congress hotels, Auditorium Hotel and Theater, the Standard Oil, Willoughby, and Fine Arts buildings, Straus Building, Orchestra Hall, the McCormick, Railway Exchange, People's Gas and Monroe buildings, and the University Club, the last being a fine example of pure Gothic. Farther north are the Chicago Athletic Club, the Michigan Boulevard, Public Library, Crerar Library, Lake Michigan, Carbide and Carbon, Bell, and 333 North Michigan Avenue buildings. There are no buildings on the east side of the boulevard within this mile ex-

cept the Art Institute, a beautiful example of Renaissance architecture, but just south of Park Row, at the foot of Roosevelt Road (12th street), is the stately Field Museum, of white marble, erected in 1918. Near this are the great stadium, known as Soldier Field, with seating capacity of over 110,000 people, the Shedd Aquarium and the Adler Planetarium. South of these was built the Century of Progress Exposition, the most colorful world's fair in history, and the only one ever continued into a second year.

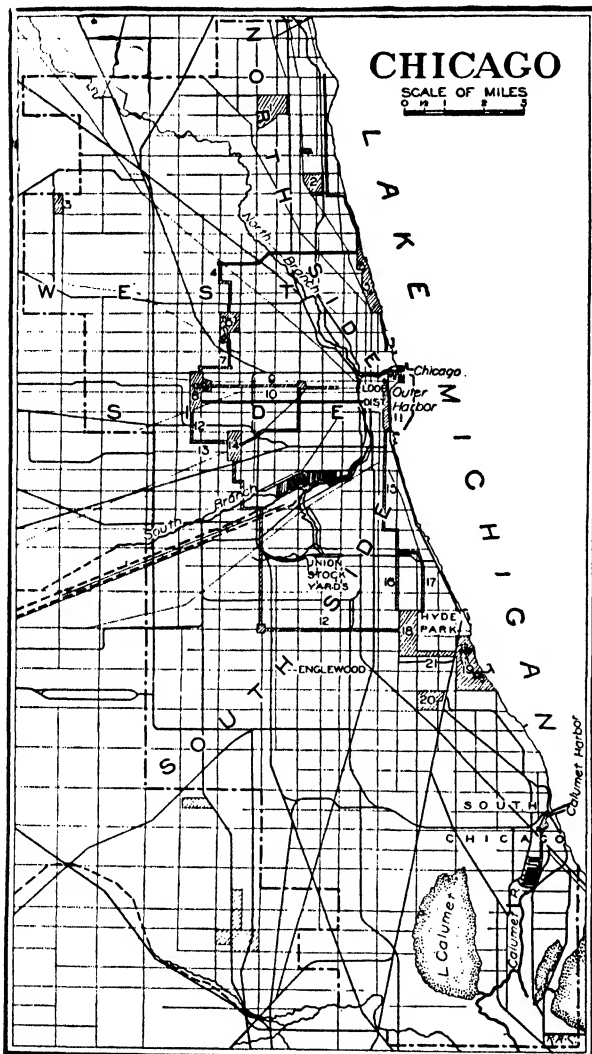
The beautifying of the lake front is a part of the "City Beautiful" plan, worked out by Daniel H. Burnham. The work is proceeding gradually. Colonnades, statuary, fountains, a concrete wall and ornamented bridges have already been erected. Michigan Boulevard is now connected with North Michigan Avenue and the Lincoln Park system directly by means of a bascule bridge, said to be the largest of its kind in the world, across the Chicago River, completed in 1920. North of the bridge are the beautiful Wrigley buildings, the Tribune Tower, Medinah Temple, and farther north the Palmolive Building and Tower, the Drake Hotel and other impressive structures.

The streets of Chicago are regularly laid out; and they run usually north and south and east and west. Some of them, such as Western Avenue and Halsted Street, extend nearly the entire length of the city. In general the streets are broad, and the building line has been strictly observed through their entire length. A uniform system of numbering throughout the city enables one to find any point without difficulty. Madison, extending east and west, and State Street, extending north and south, are taken as the base lines and divide the streets crossing them into north and south and east and west. North and south streets are numbered from Madison, and east and west streets are numbered from State Street. There are 800 numbers to the mile, so the number tells almost exactly the location and the distance from the base line.

Buildings of Note. In Chicago was built the first steel frame skyscraper, the Tacoma Building. In recent years many buildings have been erected far surpassing in beauty and size this prototype. Progress in this direction since 1920 has been most remarkable. One of the most impressive edifices of the downtown section is the combined city hall

and county building, a massive structure of steel and granite covering an entire block. The Federal Building, occupying the square bounded by Adams, Jackson, Dearborn and Clark streets, is sixteen stories high and is

Roanoke Tower, Field Building, facing on three streets; Civic Opera Building, America's finest home of classical music; the Daily News Building, Steuben Club, Pure Oil Building, and new Postoffice.

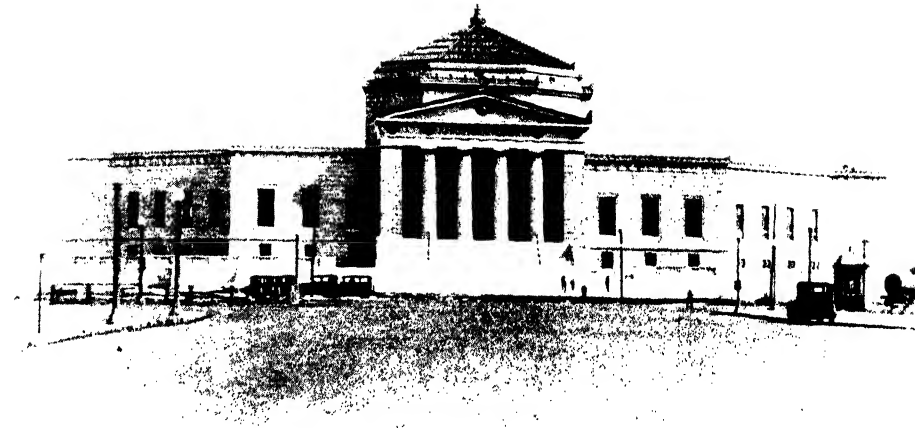


1, Rose Hill Cemetery. 2, Graceland Cemetery. 3, Mount Olive Cemetery. 4, Humboldt Boulevard. 5, Lincoln Park. 6, Humboldt Park. 7, Central Park Boulevard. 8, Garfield Park. 9, Washington Boulevard. 10, Jackson Boulevard. 11, Grant Park. 12, Garfield Boulevard. 13, Douglas Boulevard. 14, Douglas Park. 15, Michigan Boulevard. 16, Grand Boulevard. 17, Drexel Boulevard. 18, Washington Park. 19, Jackson Park. 20, Oakwoods Cemetery. 21, Midway Plaisance.

surmounted by a great dome 297 feet above ground level. Among the lofty structures in the loop or quite close to it are the Methodist Temple, with its beautiful spire (555 ft.);

La Salle Street, the Wall Street of the Middle West, is lined with handsome buildings, housing the great banking and insurance corporations. At the foot of La Salle Street on Jackson is the new home of the Chicago Board of Trade, 40 stories high, and near it are the massive structures of the Illinois Merchants Bank, the Federal Reserve Bank, the Central Trust Company, The Chicago Stock Exchange, the Northern Trust Co., and The Insurance Exchange. Only a short distance away are the Bankers' Building, the First National Bank Building, and the American National Bank Building, recently constructed. The Marshall Field retail building is the handsomest of the department stores. It occupies the block bounded by State, Washington and Randolph streets, and Wabash Avenue (the second street west of the lake). An annex, twenty stories high, housing the Men's Store and scores of offices, has been erected opposite the main building on the south, the two being connected by a subway under Washington Street. As the store has forty-four acres of floor space, it far surpasses any other store in the world in size, and it is also unmatched in beauty of furnishings and equipment.

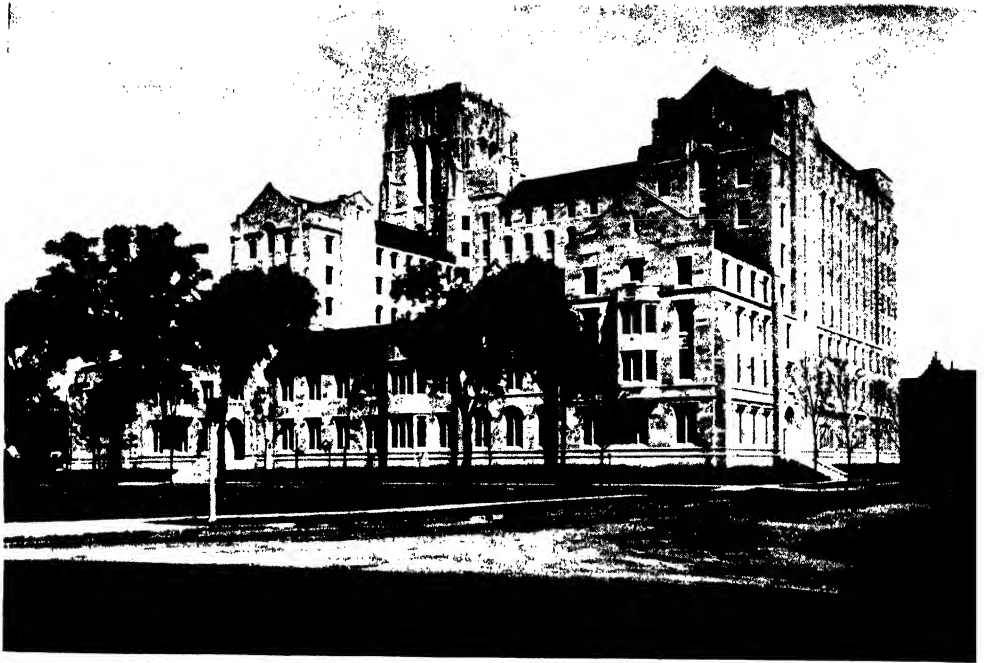
Parks and Boulevards. With over 4,600 acres of public parks and more than seventy miles of boulevard within the city limits, Chicago has a park system that is admirable in every respect. There are seven major parks and over thirty smaller ones. The two largest—Lincoln, of 517 acres, and Jackson, of 543 acres—lie along the lake, on the North and South sides, respectively. In the summer time both are visited daily by thou-



CHICAGO

Above: The John G. Shedd Aquarium, in Grant Park.

Below: The Museum of Science and Industry, in Jackson Park, formerly the Fine Arts Building of the World's Fair of 1893.



THE INTERNATIONAL HOUSE, GIFT OF JOHN D. ROCKEFELLER, JR.
 Adjoining the University of Chicago campus; for use of college and university
 students of all nations.



Ewing Galloway

WHERE MICHIGAN AVENUE FACES THE INLAND SEA
 The open space is Grant Park, which extends eastward to Lake Michigan.

[See over.]

sands of families, and they are well equipped with boating lagoons, bathing beaches, tennis courts, baseball fields, golf links and recreation houses. Lincoln Park contains one of the finest zoological collections in the world, comprising about 1,800 animals, and an Academy of Natural Sciences, with 250,000 specimens. Jackson Park, which was the site of the great World's Fair, is connected with Washington Park (371 acres), by the Midway Plaisance, a magnificent boulevard 660 feet wide. The latter park has many recreation features, but is especially noted for its beautiful landscapes and charming views. From Washington Park one may drive by splendid boulevards to Marquette Park (323 acres), also on the South Side, and to the West Side parks, Douglas (182 acres), Garfield (187 acres) and Humboldt (206 acres). These are all provided with charming lagoons, recreation grounds, flower gardens, statues, drives and shrubbery; in Garfield Park is the largest tropical plant conservatory in the United States.

Scattered through the city are numerous smaller parked areas, breathing spots for tired humanity. The construction of these is continually going on, and great effort has been made to make them of value to the public through the installation of gymnasiums, swimming pools, skating ponds, playgrounds for children, reading rooms, etc. In many instances school yards of considerable area have been converted into neighborhood recreation centers.

Chicago's boulevard system is supplemented by miles of suburban drives. There is connection on the south with the magnificent highway system of Indiana; and Sheridan Drive, which traverses the city north of Lincoln Park, extends for miles through some of the most beautiful lake shore suburbs in the world. The outer drives, along the lake front, are almost unbroken for a distance of about ten miles.

A Summer Resort. The moderating effect of the lake on the summer heat and its miles of beaches have brought Chicago into front rank as a popular summer resort. At the numerous open stretches of beaches on the lake front, for the most part kept open and under public control, thousands of people gather during the heated days of summer to enjoy the delights of lake bathing. Public golf courses are maintained in many of the city parks. A city-owned enterprise

is the Navy Pier at the foot of Grand Avenue, which is over half a mile in length. The eastern end of the structure, jutting 660 feet into the lake, is devoted to recreation purposes. Free band concerts, patriotic rallies and community concerts are common occurrences in the great auditorium, and there is provision for dancing and refreshment. The pier is also the docking point of many of the lake excursion boats. Of the various resort hotels in the city, two are especially attractive because of their location on the lake shore—Edgewater Beach Hotel on the North Side, and Chicago Beach Hotel on the South Side.

Libraries. Chicago has three large libraries and a number of smaller ones. The Public Library, on Michigan Avenue, Washington and Randolph streets, is housed in one of the finest and most complete library buildings in the country. The interior is finished in Sienna and Carrara marble and glass mosaic and is remarkable for the beauty of its design. At the north end of the building is Grand Army Hall, finished in verde antique and containing in stone mosaic the badges of all the different army corps. The library contains about 1,687,000 volumes and besides the station at the central building, it maintains stations at the small parks and in various other localities in all parts of the city. These stations make the Public Library easily accessible to all. The Newberry Library occupies a magnificent granite building at Clark Street and Walton Place on the north side. It was established by the will of Walter S. Newberry, who bequeathed, over \$2,000,000 for the purpose. It contains over 494,000 volumes and is especially valuable for its works on history, literature and philosophy. The John Crerar Library, now located in its beautiful building next to the Public Library, contains over 575,000 volumes and specializes in the natural sciences, industries, medical research and social and economic sciences. This and the Newberry are reference libraries and are free to all who wish to consult them, but books cannot be taken away. The Chicago Historical Society has a valuable library of history, and there is also a good library in the Lewis Institute. Besides these there are a number of law and medical libraries maintained by private organizations, which are open to members. The University of Chicago maintains a library of over 1,060,000

volumes, which is primarily for the use of the students and faculty of the university, but may be consulted by the public on payment of a small fee.

Education. Chicago maintains an elaborate and complete system of public schools, ranging from the kindergarten to the Chicago Normal School. There are more than a score of high schools and nearly 300 elementary schools. The 477,000 pupils are taught by about 12,540 teachers, and the newer school buildings represent the highest achievements in modern architecture and equipment. Among the higher institutions of learning are the University of Chicago, located on the Midway Plaisance, near Jackson Park; Northwestern University, which has its law, dental and medical schools within the city limits, and the College of Liberal Arts in Evanston, a suburb; Lewis Institute; De Paul University, Loyola University and the Y. M. C. A. Institute. Among the special institutions worthy of note are the Chicago Musical College, the American Conservatory of Music, and the Art Institute. The latter contains an extended collection of paintings, statuary and antiquities, an art library, a lecture hall and a large number of classrooms. This institution enrolls about 2,500 students each year.

Institutions. The city contains hundreds of churches and a large number of hospitals, the most noted among which are the Cook County Hospital, the Municipal Contagious Hospital (opened in 1917), the Chicago Lying-In Hospital (1917), Saint Luke's, Mercy, the Presbyterian, the Michael Reese, the Alexian Brothers' and Wesley. The best known of the social settlements is Hull House, situated in the center of the Ghetto district on the West Side, and famous throughout the world for its original methods and its success. Other settlements which have also obtained a wide reputation are Chicago Commons, Chicago University Settlement and Northwestern University Settlement. The United Charities and the Bureau of Hebrew Charities maintain a corps of trained inspectors and workers, who give their entire time to the needs of the poor and the unfortunate and see that charity is properly and worthily bestowed. These are among the most important organizations in the city.

Water Supply and Drainage. The people of Chicago require about one billion gallons of water a day, and this vast quantity is

brought to them by means of an elaborate system of cribs, tunnels and pumping stations. Nine tunnels under the lake convey the water from the cribs to the land tunnels, of which there are ten. The lake water is exceptionally pure under normal conditions, and has been so since the completion of the great drainage canal, which reverses the flow of water in the Chicago River and carries the city sewage to the Mississippi by way of the Illinois River (see DRAINAGE CANAL, CHICAGO).

City Transportation. Chicago's vast army of workers are brought to their places of labor by means of street cars, busses, elevated trains and suburban trains of several railway systems. The city government shares in the management of the surface lines and receives fifty-five per cent of the profits. The accumulated money, called the traction fund, will undoubtedly be used at some future date in the construction of subways to relieve the present congestion in the loop. There are four great elevated systems, with about 200 miles of track. Three of these systems connect with suburbs on the west and north, and there is a mutual transfer system.

Travel by Air. A network of airlines spreads from Chicago to all parts of the nation. The Municipal Airport is second in the country in point of activity, Newark being first. Mail, express, and passenger planes arrive or depart every few minutes.

Railways and Shipping. This city is the world's greatest railway center, forty per cent of the country's railroad mileage terminating here. Over thirty roads have their terminals in Chicago, and this number would probably be larger were there space for more trackage. Plans for a mammoth union station were halted by the World War, (and not since resurrected), as the government deemed it unwise to divert the vast amount of capital, labor and raw materials required, from war construction. At present passenger traffic is taken care of by six large stations, some of which are very much overcrowded. Most of the freight destined for Chicago is unloaded at a huge distribution center southwest of the city, and transferred to various smaller terminals within the city limits, and the principal commercial and industrial establishments are connected with these terminals by tunnels thirty-three feet below street level; there are sixty miles of these freight tunnels. Supplementing the railway system are fourteen hun-

dred miles of belt railroads encircling the city.

Chicago is also an inland port of first rank, and has lines of freight and passenger steamers connecting with all the large lake ports. In normal years over 6,000 ships enter and clear the port. Iron, grain and lumber are brought here in vast quantities, some to be reshipped to other centers. The construction of the Municipal Pier, mentioned above, greatly improved docking facilities. This pier is 3,000 feet long and 292 feet wide, and cost \$4,500,000. The superstructure, of brick and steel, rests on a solid foundation of piling and concrete.

Manufactures. The location of Chicago as a distributing center and its proximity to the immense coal fields of Illinois have made it an important manufacturing center. The city has over 20,000 manufacturing establishments, which employ nearly 350,000 workmen. The largest of its industries is meat-packing and slaughtering, located in the stockyards district, between Thirty-ninth and Forty-third streets, on the South Side. Here are found the largest meat-packing houses in the world (see MEAT-PACKING). Next to the meat-packing industry in importance are the manufacture of foundry and machine shop products, iron and steel, clothing and agricultural implements, and printing and publishing. Because of the city's location in the center of one of the world's greatest grain regions, the manufacture of agricultural implements has become very important. This centers in the immense establishments of the International Harvester Company, the McCormick Harvester Works and the Deering Harvester Works. The total value of the city's manufactures is about two and a half billion dollars a year.

History. The site of Chicago was visited by Marquette and Joliet in 1673. In the early French narratives mention is made of the *Checagou* River, that being the Indian name of the wild onion which grew profusely on the river banks. It is a true, if unromantic, detail that *Checagou* is also the Indian designation for the skunk. Other French explorers followed Father Marquette, but the first permanent settler was a negro from Santo Domingo, who built a cabin on the river bank in 1779. In 1804, the year in which the first Fort Dearborn was built, a white man, John Kinzie, became owner of the cabin, and at the same time won the dis-

Questions on Chicago

[An outline which can be used as a type for a city the size of Chicago will be found with the article CITY.]

What is the geographical position of Chicago, and how has it affected the growth of the city?

What was its per cent of increase between 1840 and 1910?

Why does not Chicago have such tall buildings as New York?

What is the Chicago "Loop"?

How does Chicago compare with other large cities as a retail shopping center?

Describe Grant Park and Michigan Boulevard.

What is the tallest building in the city? What is the name of the first skyscraper ever built?

What street is the Wall Street of the Middle West?

How many acres of floor space has the Marshall Field department store?

If you made a complete circuit of Chicago's major parks, how many would you visit?

What special features have the smaller parks?

Why has the city earned a favorable reputation as a summer resort?

What can be said about the north shore suburbs?

For what purposes is the Municipal Pier used?

How does the Public Library differ from the Newberry and John Crerar?

How many pupils are enrolled in the public schools of Chicago?

What is the source of the city's water supply?

How is freight carried from the railway terminals?

What does the name *Chicago* mean?

What disasters has the city suffered?

What is its leading industry?

When was the World's Columbian Exposition held?

How many cities in the world are larger than Chicago?

How many Presidents have been nominated in conventions in Chicago?

How does the Chicago River divide the city?

tion of being Chicago's first white settler.

Fort Dearborn was erected on the south bank of the river. Its site, now marked by a memorial tablet, is one of the busiest spots in Chicago, just west of the south end of Michigan Boulevard bridge. Though abandoned at the time of the Indian massacre of 1812, the fort was rebuilt four years later, and remained an honored landmark until 1856. After 1816 a busy little frontier village grew up about the fort, and by 1830 it was large enough to be platted. It then contained twenty-seven voters, and was nearly half a square mile in area. Cook County was organized a year later, and a post office was built at the corner of Franklin and South Water streets. In 1833 the town was incorporated, and in 1837 it received a city charter. In that year the area was ten square miles, and the population was 4,170.

From that time the young city enjoyed a steady growth. The completion of the Galena & Chicago Union Railroad and the Illinois & Michigan Canal in 1848 gave the place connection with the territory about it, and was the beginning of the city's supremacy as a transportation center. By 1870 it had a population of about 300,000, but the following year it was almost wiped out by a great fire that old settlers still talk about. Though the homes of 100,000 persons were destroyed and the property loss was \$196,000,000, a finer and more substantial city quickly rose from the ruins.

The later history of Chicago is told in the statistics of its population, trade and industry. It has been the scene of serious labor disturbances, such as the Haymarket Riot of 1886, the Pullman car strike of 1894, and the teamsters' strike of 1904-1905, but its prosperous development has been uninterrupted. In 1893 the city welcomed visitors from all over the world, the occasion being the celebration of the 400th anniversary of the discovery of America. This celebration—a world exposition—is renowned as being the first world's fair of a really comprehensive nature (see *WORLD'S COLUMBIAN EXPOSITION*). In 1933 the centennial anniversary of the city was celebrated by A Century of Progress Exposition, on 427 acres of land recovered from Lake Michigan, designed to show the century's progress in the arts and sciences. It was repeated in 1934. Because of its central location and its splendid hotel and auditorium facilities, Chicago is a favored place for political and commercial con-

ventions. Eleven Presidents of the United States have here been nominated for the highest office in the nation.

CHICAGO, UNIVERSITY OF, a university located at Chicago, Ill., ranking with the foremost educational institutions in the United States. It is the outgrowth of a school of collegiate degree founded in 1857. The original university suspended in 1886 for want of funds, and the present institution is the result of efforts begun by the American Baptist Educational Society a short time later. The rapid development of the university was due largely to the generous contributions of the Rockefeller family, whose benefactions represent a total of \$46,000,000. The present university was chartered in 1890 and opened Oct. 1, 1892.

The University, in 1931, radically revised its educational organization. Abolishing, as such, the four-year college and the graduate schools, the reorganization plan set up (1) a College, stressing general education and designed to require two years of study for the average student; and (2) four upper divisions, the Humanities and the Social, Biological and Physical Sciences, designed to introduce the technique of advanced study from the College period on and to integrate research within the divisions. Six professional schools, Law, Medicine, Divinity, Business, Social Service Administration and Library Science, retained their separate entities. In the College individual initiative is encouraged through the elimination of course credits and course grades and the establishment of comprehensive examinations as the sole standard of achievement. These examinations may be taken by any students who feel themselves ready, whether or not formal preparatory courses have been completed. Under the plan a student may progress as rapidly or as slowly as his abilities determine.

A university extension division carries on extension work by means of lecture courses connected with study classes, and by correspondence work, through which a part of nearly every course in the university may be taken. It also assists this work by sending traveling libraries to centers where lecture courses are maintained.

The university campus lies along the Midway Plaisance, a magnificent boulevard connecting two of Chicago's finest parks. On this campus of 110 acres, the University has 85 buildings, mainly of Gothic architecture,

devoted to educational uses. The Yerkes Observatory, with its 40-inch refracting telescope, is at Williams Bay, Wis. The University Chapel, a group of medical buildings, and a series of student residence halls are notable recent additions to the campus.

The University has assets of more than \$100,000,000, of which more than \$60,000,000 represent endowment. The University Library contains 1,000,000 volumes. The average enrollment in recent years is over 14,000 in all departments, the fall registration being over 5,000. Graduate students number approximately 1,650 men and 800 women; undergraduates, 1,550 men and 1,400 women. In addition, the home study department enrolls an average of 7,000 students. Adjoining the University is International House, a gift of John D. Rockefeller, Jr., opened in 1933 to provide suitable living quarters for visiting students from other countries.

CHICK'ADEE. See TITMOUSE.

CHICKAHOMINY, *chik a hom'i ni*, a river of Virginia that rises about twenty miles northwest of Richmond and flows southwestly till it joins the James, sixty miles above Norfolk. The stream is not large, but it is noted for the numerous battles that occurred on or near its banks during McClellan's and Grant's campaigns against Richmond in the Civil War. The most important of these engagements were Mechanicsville, Williamsburg, Seven Pines, Gaines's Mill and the Battles of Cold Harbor. See CIVIL WAR.

CHICKAMAUGA, *chik a maw'ga*, and **CHATTANOOGA NATIONAL MILITARY PARK**, a government reservation embracing the battlefields of Chickamauga and Missionary Ridge, southeast of Chattanooga, Tenn. The park contains nine square miles; it was dedicated in 1895, and was the first great Civil War battlefield to be set apart as a memorial of the war. Monuments and tablets mark the historic spots and preserve for all time the incidents connected with two of the greatest struggles of that conflict.

Battle of Chickamanga, fought September 19-20, 1863, between a Federal force of 55,000 men under General Rosecrans and a Confederate army of 70,000 under General Braxton Bragg. Rosecrans approached Chattanooga, and Bragg, fearing that he would be besieged, retreated southward until he received reinforcements. The retreat was halted at Chickamauga, and Bragg prepared for battle, Rosecrans taking up a defensive

position along Chickamauga Creek. On September 19 General Polk crossed the river and struck the Federal left wing under Thomas, but the latter repulsed the assault, inflicting a terrible loss.

On the following day the same position was again attacked without effect, but a misunderstanding of orders caused a breach in another part of the Federal line, and a concentrated attack by the Confederates caused all but Thomas's division to flee from the field. Thomas continued to grapple with his opponent, until he was summarily ordered to retreat. It was during this battle that he earned his sobriquet of the "Rock of Chickamauga."

CHICK'ASAW, a once powerful tribe of Indians living in Northern Mississippi and Tennessee. In 1540 De Soto reached one of their villages and, attempting to compel service from them, was attacked. The Chickasaw were always hostile to the French, but formed a friendship with the English. Their relations with the United States were usually friendly, and in 1834 they gave up their lands, receiving nearly four million dollars in payment. With this they bought land from the Choctaw, in the extreme western part of the Indian Territory, where they finally were recognized as the Chickasaw nation, under their own government. They were slaveholders and naturally sided with the South, but they submitted to the freeing of their slaves after the war. They are now prosperous citizens of the state of Oklahoma and of the United States. See FIVE CIVILIZED TRIBES.

CHICKASHA, *chik'a shay*, OKLA., founded in 1895 and named for an Indian tribe, is the county seat of Grady County, forty-two miles southwest of Oklahoma City, on the Saint Louis & San Francisco, the Santa Fe and the Chicago, Rock Island & Pacific railroads, and on the unnavigable Washita River. It has cottonseed oil mills, machine shops, railway shops, and a furniture factory. The city is one of the world's largest cattle-feeding points, and is a great cotton-concentrating town. The Oklahoma College for Women, with fourteen buildings, is here; there is also a business college, a library and a hospital. Population, 1920, 10,170; in 1930, 14,099.

CHICKEN POX, a disease of childhood characterized by an eruption of small red pimples, which appear in successive crops

on different parts of the body. Though highly contagious, chicken pox is rarely dangerous or followed by bad effects, if proper precautions are taken. Each day the patient's body should be sponged, and the eruption should be kept oiled. Cleanliness is very important, and the child should be watched to see that it does not scratch the pimples.

CHICLE, *chik'ol*, a gumlike sap of a tree called the sapodilla, native of Central America and tropical South America. It has been naturalized in Mexico, particularly in Yucatan. The gum is used almost exclusively and in ever-increasing quantities in the manufacture of chewing gum (which see).

CHICOPEE, *chik'ope*, Mass., a suburb of Springfield, three miles distant, on the Connecticut River and the Boston & Maine Railroad. The river furnishes power for large factories, which make rubber goods, tools, sporting goods, firearms, cotton goods, carpets; etc. The town has "Our Lady of the Elms," an academy conducted by the Sisters of Saint Joseph, and a hospital. The place was founded in 1640, became a town in 1848 and a city in 1890 by the annexation of Chicopee Falls, Fairview and Willimansett. Population, 1920, 36,214; in 1930, 43,930, a gain of 21.3 per cent.

CHICORY, *chik'ori*, or **SUCCORY**, a plant, native of Europe and Asia, but long since naturalized in the United States and Southern Canada. It has a fleshy root, spreading branches, coarse leaves and bright blue flowers. The leaves are sometimes blanched, to be used as salad. But the most important part of the plant is its long, fleshy and milky root, which, when dried, roasted and ground, is now extensively used for adulterating coffee. The presence of chicory in coffee must be stated on the label of the package, in accordance with recent pure food laws. Its presence may easily be detected by putting a spoonful of the mixture into a glass of clear, cold water, when the coffee will float on the surface and the chicory will separate and discolor the water as it subsides.

CHICOUTIMI, *she koo te me'*, QUEBEC, the county town of Chicoutimi County, on the Saguenay River and Canadian National Railway, 227 miles from Quebec city. It is one of the most important centers for the manufacture of wood pulp, more than 60,000 tons being exported to England alone; other industries include foundries, machine shops,

butter and cheese factories. Wheat, oats, hay, potatoes and blueberries are raised in large quantities in the surrounding region. The city is the seat of a bishop and has a Roman Catholic cathedral and college. Population, 1931, 11,826.

CHIFFON, *shif'on*, a word from the French, meaning in that language, *rag* or *flimsy cloth*. It is applied in English-speaking countries to a thin, gauzy fabric much used for women's veils, ruches, undergarments, dress trimmings, etc. It is marketed in a variety of colors, but chiefly in delicate shades. Both silk and cotton chiffons are in demand.

CHIHUAHUA, *che wah'wah*, MEXICO, founded in 1539, is the capital of the state of the same name, on the Mexican Central Railway, 750 miles north of Mexico City and 225 miles south of El Paso, Tex. It is generally well built and is supplied with water by a notable aqueduct. The industrial establishments include iron foundries, machine shops, and manufactories producing cotton and woolen goods, carpets, beer and other articles. The city is located in a rich mining section and has a large trade, being the leading commercial center in the northern part of Mexico. It was the scene of severe fighting between the forces of Villa and Carranza in 1913-1914. Population, 1930, 61,526.

CHILBLAIN, *chil'blane*, a small, oval or round patch of red, loose skin, appearing usually on the foot, but sometimes on the face, as a result of inflammation, caused by exposure to cold or frost. The inflammation is accompanied by stinging, itching and burning sensations and some soreness. Chilblain is caused by too sudden changes of temperature when the blood is not circulating well. Those who wear tight shoes and are not careful to keep the stockings dry and the feet warm are liable to suffer from chilblain. Helpful remedies include tincture of iodine, ichthyol and tincture of camphor.

CHILD LABOR. By this term we mean the hiring of children to work for wages. The tragedy of the working child is an old story, but men and women did not awaken to the abuses connected with child labor until the factory system began to crush the health and blight the lives of thousands of little citizens.

One who desires a vivid and heart-stirring account of what children have suffered in the past should read Arnold Bennett's *Clay-*

hanger. It was misery which he so graphically describes that aroused humane men and women in England to demand reforms, and it was in 1802 that the English Parliament passed the first law regulating child labor, as that term is understood to-day. While the law was a step forward, it merely forbade children in the cotton mills to work more than twelve hours a day; it did, however, stipulate that apprentices should receive elementary instruction. Fortunately, England did not stop there, but gradually enacted laws of a much broader scope, limiting employment to children above twelve years, and applying the principle to a wide range of industries.

On the continent similar laws were passed, and at the outbreak of the World War these statutes were being rigidly enforced. As was natural, the terrible demands made by that struggle on the industrial systems of the warring nations tended to weaken the enforcement of child labor laws, and large numbers of children from ten to fourteen were released from school and put to work on farms and in munition factories. The effect of war conditions on the children was a vital and serious subject in all the belligerent countries. An exhaustive report on this problem has been made by the Children's Bureau of the United States Department of Labor.

Child labor regulation is a more recent innovation in the United States and Canada. In the former country the rapid development of the industrial life of the nation after the Civil War brought with it a host of abuses in respect to employment of children, and as late as 1900 children under sixteen formed 13.3 per cent of all employees in American cotton factories. Thereafter the percentage declined. As the regulation of child labor is left to the states, the laws vary considerably. In general, they fix an age below which children cannot be employed in specified industries, and there are various regulations as to night work, length of working day, school certificates, physical qualifications, etc.

Previous to 1917 the age limit for factory work in over half the states was fourteen, and in a number of states young people under sixteen could work only eight hours a day. The entrance of America into the World War was the signal for a number of attempts to suspend the child labor laws, but this tendency was vigorously opposed by the National Child Labor Committee and various other organizations. In 1916 a national child labor

law was passed by Congress, but this was declared unconstitutional by the Supreme Court in 1918. A second law (1919) was also declared invalid. In 1924 Congress passed a proposed Constitutional amendment, which was submitted to the states for ratification. During the seven-year period for acceptance it failed to receive the approval of three-fourths of the states. In Canada the subject of child labor is under provincial control.

CHILDREN, SOCIETIES FOR, societies organized for the purpose of caring for children who are dependent, or whose parents are unable to care for them. The most important of these organizations in America are the Society for the Prevention of Cruelty to Children, the American Humane Association, Saint Vincent's Aid Society, the Jewish Relief Association and the Children's Aid Society. The first organization was established in New York in 1875, and similar organizations were soon started in other large cities of the country. The purpose is to shield children from immoral influences, to save them from inhuman treatment and neglect and, especially, to prevent their being sentenced by courts in large cities to confinement with professional criminals. The work of the aid and relief associations is given largely to finding homes for dependent children and for those whose parents are unable to care for them. These associations also maintain homes for crippled, blind and other defective children. Among the most important agencies for the protection of delinquent children is the Juvenile Court (which see). See, also, **CHILDREN'S BUREAU**.

CHILDREN'S BUREAU, a part of the United States Department of Labor. The bureau was established in 1912, for the purpose of investigating and reporting upon all matters pertaining to the welfare of children. Its work thus includes such problems as infant mortality, the birth rate, juvenile courts, child labor and any state legislation affecting children. It is not intended to relieve the states of responsibility for these problems, but to aid them in obtaining satisfactory solutions. Miss Julia Lathrop, for many years associated with Miss Jane Addams at Hull House, was appointed the first director of this bureau. See **LATHROP, JULIA C.**

CHILDREN'S DISEASES. There are certain diseases which are liable to attack children who mingle together in the school-room or elsewhere. If the mother can recog-

COMMUNICABLE DISEASES AMONG SCHOOL CHILDREN Information for Parents and Teachers

DISEASE	PRINCIPAL EARLY SIGNS AND SYMPTOMS	METHOD OF INFECTION	INCUBATION PERIOD	EXCLUSION	REMARKS
Chicken-Pox	Onset gradual. May be no symptoms. Usually there is feverishness, but this may be very mild. Rash appears on second day as small raised pimples which shortly become filled with clear fluid; later scabs form. There may be successive crops of this rash up to the tenth day.	Fresh or dried crustate from eruption.	10 to 15 days.	Exclude child with disease* until all scabs have disappeared. Well children from same house may attend school.	When the child returns, examine the head for overlooked scabs and scales. A mild disease, and there are seldom any after-effects.
Diphtheria	Onset may be rapid or gradual. The early signs are those of sore throat with grayish-white patches on the membrane of throat, palate or tonsils. There may be swelling of the glands of the neck about the angle of the jaw. Later in the disease there is great prostration.	Discharges sprayed or thrown from the mouth or nose in coughing, sneezing or spitting. Diphtheria germs may be carried by an uninfected person or recently infected articles.	2 to 7 days; oftenest 2.	Exclude child with disease* until health officer gives permission to return. Exclude other children who are from the same home unless there is a change of residence, in which case exclude for 7 days, and then readmit if there have been no symptoms of disease and if children do not return to infected house.	This is a very serious disease. When more than one case occurs in a class-room all children suffering from sore throat should be excluded. Diphtheria varies greatly in its form, and mild cases are sometimes not recognized. They are however, as infectious as severe one, so that every precaution should be taken. Having had the disease confers no immunity.
Measles	Begins like a cold in the head, with fever, running nose, watery, inflamed eyes and sneezing. The rash appears about the third day and consists of small, irregular groups of dull-red, slightly raised spots. These are usually first seen on the forehead and face, and they rapidly spread over the entire body. The rash may almost disappear if the patient becomes chilled, but reappears when the patient again becomes warm. A positive sign of measles is the so-called Koplik spots. These are bluish-white specks upon a red ground which are best seen in the inside of cheeks opposite the molar teeth. Strong sunlight may be necessary to see these.	Discharges sprayed or thrown from mouth or nose in coughing, sneezing or spitting.	7 to 18 days; oftenest 14.	Exclude child with "disease." Child may return to school 8 days after disappearance of rash if nose and throat are free from discharges. Exclude other children who are from the same home unless there is a change of residence, in which case exclude for 14 days, and then readmit if there have been no symptoms of disease and if children do not return to infected house.	Measles is infectious even before the rash appears. After-effects are often more serious than the disease. Complications resulting in broncho-pneumonia and even tuberculosis are frequent, and account for the large death rate from this disease. Inflammation of the middle ear and weak eyes often result. Koplik spots are nearly always present in measles; they are not found in other diseases and they usually appear two or three days before the skin eruption, generally disappearing at the time of full eruption. Recognition of this sign will be very valuable in preventing an epidemic.
German Measles	Illness usually slight. Onset sudden. The rash is generally the first thing noticed. Unlike measles, there is no cold in the head, although the eyes may be inflamed and slight fever and sore throat may accompany the attack.	Discharges sprayed or thrown from mouth or nose in coughing, sneezing or spitting.	10 to 12 days.	Exclude child with disease. Child may return 7 days after disappearance of rash. Well children from same home may attend school.	German measles is usually very mild. The danger from it is slight, although none of the usual precautions should be neglected. Almost no after-effects.

Mumps	The onset may be sudden or gradual, beginning usually with slight fever, nausea, pain and swelling about the angle of the jaw. The jaws may be stiff and saliva sticky.	Discharges sprayed or thrown from mouth or nose in coughing, sneezing or spitting.	2 to 3 weeks.	Exclude child with disease* until all swelling has disappeared. This usually requires a period of three weeks. Well children from same home may attend school.	Mumps is very infectious. Early symptoms should therefore be noticed and patient immediately excluded. Defective hearing may be serious after-effect.
Scarlet Fever	The onset is usually sudden. Vomiting, sore throat, headache or fever may be first symptoms noted. Child's cheeks, eyes are not watery or congested in beginning of disease. The rash usually appear within 24 hours and is seen first on the neck and upper part of the chest. It appears as fine spots, evenly diffused and bright red. Later the skin peels in scales, flakes or large pieces. In the early part of the disease the tongue is usually whitish, with bright red spots resembling a strawberry.	Discharge from ears. Scarlet Fever germs may be carried by an uninfected person or recently infected articles.	1 to 7 days; oftenest 2 to 4.	Exclude child with disease* for a minimum period of 42 days. Exclude other children who are from same home unless there is a change of residence, in which case exclude for 10 days and then readmit if there have been no symptoms of disease and if children do not re- to infected home.	Scarlet Fever is dangerous, both during the attack and because of the after-effects. Slight attacks are as infectious as severe ones. There is great variation in the type of the disease, and many mild cases are not recognized, and are frequently responsible for starting severe epidemics. The period of incubation from 6 to 8 weeks from the onset of the disease. Second attack is rare. When scarlet fever is occurring in a school, all children with sore throat should be sent home.
Small-Pox	Onset apt to be sudden. Nausea and fever, accompanied by backache or headache. Rash is seen first about the face and wrists. It consists of first of small red spots, which quickly become elevated and hard, like shot felt under the skin.	All discharges from nose, mouth, sores and scabs (small pox germs) may be carried by an uninfected person or recently infected articles.	9 to 15 days; oftenest 12.	Exclude child with disease* until all crusts or scales have fallen off. Exclude other children from same home unless there is a change of residence, in which case exclude for 14 days and then readmit if there have been no symptoms of disease and if children do not return to infected home. Children who have been successfully vaccinated need not be excluded, provided there is a change of residence.	Small-pox is particularly infectious. After the occurrence of a case, all persons in the school or in the vicinity of the home of the patient should be vaccinated. Vaccination is a well-nigh perfect preventive.
Whooping Cough	Early symptoms resemble those of a cold in the throat. Later there is a persistent cough which grows worse at night. The characteristic "whoop" does not develop until about a week or more after the onset of the disease. Spasms of coughing often end in vomiting.	Discharges sprayed or thrown from mouth or nose in coughing, sneezing or spitting.	7 to 10 days.	Exclude child with disease* until whoop ceases usually a period of six weeks. Well children from the same home may attend school.	Whooping cough is especially infectious during the first few weeks. There is great variation in the types of the disease. Second attacks are rare. It may cause great debility. Frequently fatal in infancy. Indeed this disease causes as many deaths as scarlet fever.
Influenza or Grippe	Onset abrupt, beginning with feverishness, pain in head, back and limbs, and usually cold in the head. Chills. Lassitude is a characteristic symptom.	Discharges sprayed or thrown from mouth or nose in coughing, sneezing or spitting.	1 to 4 days; oftenest 3 or 4 days.	Exclude child with disease until catarrhal symptoms have ceased. Well children from same home may attend school.	Influenza is excessively infectious. After-effects often very serious and accompanied with great prostration and nervous debility. Many complications, such as pneumonia, croup, and chronic bronchitis.

(*) Notify parents and local health officer as specifically as possible.

nize the early symptoms of these diseases she can prevent needless delay in dealing with them. It is also important to know how long to keep a child excluded who has been ill. The accompanying chart conveys this information in concise form, and it should be of great value to teachers as well as parents.

CHILDS, GEORGE WILLIAM (1829-1894), one of America's best-known and benevolent newspaper men and philanthropists. He was born in Baltimore, served for a time in the navy and later entered private business. He was long identified with the *Philadelphia Ledger*, one of the first cheap newspapers, was a heavy contributor to charities, erected many monuments to celebrities and educated more than 800 boys and girls. In 1890 he published his *Recollections*. He erected a Shakespeare memorial at Stratford, monuments over the graves of Edgar A. Poe and Richard Proctor, and a stone cross on the site of the first Christian church service in California. At Colorado Springs he built and endowed a Home for Union Printers. He paid for the education of 800 boys and girls.

CHILD STUDY, an educational movement for the scientific study of children. Child study is closely related to the biological sciences (see **BIOLOGY**) and is the direct outgrowth of physiology and psychology (see **PSYCHOLOGY**). Experimental and physiological psychology revealed the close connection of mind and body and showed that mental progress depended upon physical development. This led to more systematic study of the physical development of the child. The child's mental powers have also been carefully studied, and child psychology has become a branch of general psychology.

The movement for child study became established in the United States in 1880, and by the close of the century it was thoroughly incorporated into the educational systems of the various states. Departments of education in universities provide for training teachers and specialists in this line of research. Many state normal schools make provision for child study in their courses, and some of the largest cities employ specialists who devote their entire time to instructing teachers and to the study of children. The National Education Association and nearly all state teachers' associations now have departments of child study, which hold special sessions in connection with the annual meet-

ings of those associations. Women's clubs are also engaged in some phases of the work.

In its most advanced stages, child study has become specialized and exacting. Its successful prosecution requires delicate apparatus and trained experts. Much of the work is along lines of original research and has for its purpose the discovery of facts and principles which will form a foundation for the care and training of children. This phase of the work can be carried on only in institutions especially prepared for it, such as schools of education connected with universities and the best equipped normal schools. The rate of growth of children is determined by measurement at different periods and for different months in the year. The growth of different organs, the relation of age to development in the sexes, the determination of the condition of the heart, blood vessels and nervous system at different periods, and the changes, physical and mental, which take place during the period of adolescence, are carefully noted.

There is, however, a more general line of child study and one in which both teachers and parents can participate. This does not require special apparatus nor technical training, though the latter is of great assistance. This line of study is confined to the careful observation of the child. Its purposes are to determine the development of the senses, to discover the child's interests, his strength and his endurance and to understand his physical and mental conditions. Careful observation leads almost every teacher to discover among her pupils those who are defective in sight or hearing. Because of such defects children often appear dull. If seated where they can have the best advantages for seeing or hearing, these pupils will ordinarily do the required work as well as the others in the class.

Children's dispositions, likes and dislikes, ability to apply themselves and other tendencies can best be studied in the home, and in ascertaining these facts the mother can coöperate with the teacher. The period of adolescence is often the most critical period in the child's life. It begins at about fourteen and continues until about twenty-four in males and twenty-two in females, the changes being more marked in the first two or three years of the period and varying in the degree of manifestation in different individuals. During this period both the boy and the girl need sympathy and encouragement. Because

of failure to understand the child's condition at this time, both parents and teachers often err in their management.

The results of the study of the child's mental development are seen in the radical changes which have taken place in the courses of study. Subjects which appeal to the child's interests at different periods of his development have taken the place of those which were dogmatic and abstract. Occupations for the hands, in the form of kindergarten plays, busy work and manual training, are now found in all well-systematized schools and assist in securing the development of all the child's powers. Methods of discipline have also been greatly modified for the better. Children are now led to control themselves, and cases of cruel and severe punishment seldom occur.

Related Articles. Consult the following titles for additional information:
 Child Training Pedagogics
 Kindergarten Psychology

CHILD TRAINING. The most convincing proof of success in rearing and teaching children is found in the resulting character which they possess. Character education, then, is the most significant feature of home life, of school experience and of all religious and school contacts.

By character we mean a way of living which produces and preserves as many benefits as possible for as many persons as possible for as long a time as possible. Character education seeks to promote this way of living.

Aims in Character Education. To prepare for a definite attack on the problems of character education the particular aims now commonly approved should be clearly understood. Some of these aims are in fact personal reasons why an individual wants or needs the cultivation of his own character. For example, he realizes that his many impulses require adjustment or control; he craves more or less consistently moral excellence as a personal possession; he enjoys worthy personal experiences when they are attainable; he would like always to act from the best motives.

Other aims in character education arise because the individual lives in small groups of his fellow men. He needs help to conduct himself properly as a member of a family, of a class at school, of a group of friends. He also often wants the approval of his

fellow men at large; he hopes to render useful service as a citizen; he desires to be ruled by generally accepted principles of action.

At times also he looks at the whole system of creation, the universe in which we live; he thinks of the universal creative Spirit; he realizes that to take his rightful place in the world a well-developed character is essential.

Need of Cultivating Character. Looking somewhat critically at all of the facts we discover certain urgent needs for the adjustment of character. For example, note that human experience is a growth; we begin life with total ignorance of ourselves and of suitable ways of acting toward our fellows. There are multitudes of details of conduct to be mastered. The unaided child is wholly incapable of making rapid progress in solving the problems of community living. In fact character building is a life-long task that confronts every normal human being. For character is an achievement, not a benefit conferred; we develop character only when by our own unceasing efforts we make use of the aids provided for us by parents, teachers and associates.

Then, too, life is exceedingly complex. Every person must learn how to act in many types of relations: personal, domestic, educational, religious, vocational, civic, social, and recreational. In each department of life unexpected complexities daily arise that puzzle the individual seriously. Social life is also changing continually; civilization is modified; community differences are encountered on changing residence and at times there occurs a social revolution which throws accepted maxims for conduct into confusion.

Resources in the Nature of the Child. Since we agree fully with those who make the child the center of educational theory, any plan for his correct development must grow out of a study of his nature. Just as a child develops in body and mind so must he be allowed to grow in character. This growth is possible because of his thirst for life and experience; his activity and curiosity are indispensable factors in moral development.

The child is eager not only for action but also for success. He will try to overcome difficulties and to put himself among the prize-winners. His craving for recognition

never wanes if occasionally it is satisfied; he enjoys companions and often likes to conform to the conduct pattern set by others. He welcomes well-planned routine if there is an occasional change of program. His active imagination enables him to accept a proposal for an activity that he has never yet witnessed.

We are perfectly safe in concluding that a character education program that has been adjusted to all of these facts and therefore conforms to the nature of the child is assured of success. Resistance and rebellion are not normal experiences in child training; if the child does object to guidance the parent has only to scrutinize the method used to find the cause.

Resources in the Child's Environment.

The presence of the family group into which the child is born is of inestimable value to him. Much that he needs to learn has been sufficiently tested in the home. There he normally meets an atmosphere of encouragement and friendliness. Love like nothing else makes a nest in which his tiny personality may develop favorably; the hold of the family upon the individual member of it never is wholly broken. By judicious management the home can compete successfully with almost any rival in retaining the child's affections.

It is from the platform of the home that the child steps into the world of affairs. Family contacts continuously introduce the child to other families and to many community organizations.

Ideas sweep through the community and leave no child untouched by them. The interchange of knowledge is continuous and ever-widening in scope. Fresh mental stimulus daily stirs him to moral thoughtfulness.

Distinguished men and women, boys and girls, rise before his eyes; their actions and merits are fully discussed in the child's presence. Explanations of conduct, approval of attitudes, praise for wise decisions fix the child's attention on crucial moral problems.

In a word the community and the world at large furnish abundant material out of which a program for life may be formulated.

Methods for Parents' Use. Principles of education are applicable both in the school and in the home, but parents are related to children in a particular way and desire

counsel especially adapted to their needs. In a very real sense, however, child training turns out to be parent training. It requires parental self-control and self-training to apply the wisdom needed in child guidance.

The attitude of the parent toward children in general and most of all toward those in his own family is of utmost importance. If the parent welcomes the child into the family and recognizes that children are persons with many rights, thus making room for him ungrudgingly, then the first step toward success is already taken. When the child is viewed as a source of revenue through labor or as a financial burden to be unloaded as soon as possible, no suggestions for character education can win the parents' approval. By rights the child is a comrade, a partner, a prospective citizen of no mean importance. If parents will accept the child as a companion and themselves become childlike in their sympathies, then they may serve as successful guides of children.

In such a case guidance displaces coercion under ordinary circumstances, as a means of control. The child who grows up under the dominance of another mind does not gain enough skill in self-direction to be trusted when separated from his parents. During the infancy of the child parental influence is at its maximum and rapidly diminishes after reasoning and his own experiences furnish him with increasing wisdom. Doubtless parents commit their most serious blunders in asserting excessive and irritating control over the actions of their children.

Skill in dealing with child life is not often instinctive in parents; for them personal observation and intelligent reflection over their successes and failures are essential. Much study should precede the advent of the child, but problems as critical as those which occur in the practice of medicine never fail to demand close attention throughout the life of the child.

Both parents are to bear in mind that every experience of the child assists or hinders in establishing good character; there are no vacations and no indifferent actions. Consequently, the whole home program needs to be reviewed in respect to its influence on the ideals, attitudes and moral conduct of each child in the family.

The Younger Child. Obviously the cultivating of character will call for methods varying with the age and personal peculiarities of the child. During the first year of

Personal companionship of the young child needs regulation. There must be periods of solitude while he is awake so that he may assimilate what he has sensed

CHART FOR CHILD STUDY AND CHILD TRAINING

PERIOD OF INFANCY—THE FIRST THREE YEARS					
YEAR	Character Development	Intellectual Development	Sense Development	Play and Exercise	Rest Period
1.	Submission. Control of desires.	Learning to understand spoken words.	Awakening of the five special senses.	Use of arm muscles in playing with toys. Creeping.	Sleeping from 22 hours to 16 hours a day.
2.	Quick responsiveness to commands. Greater self-control.	Talking.	Special development of tactile senses.	Walking. Playing with more elaborate toys. Using spoon, cup and plate.	Sleeping 12 hours at night. Daily nap.
3.	Showing initiative. Developing unselfishness and gentleness.	Reciting nursery rhymes. Use of picture books.	Activity of all the senses. Distinguishing tastes and colors.	Using pencil. Stringing beads. Plays involving the imagination. (Great physical activity).	Sleeping 12 hours at night. Daily nap.
CHILDHOOD FROM THREE TO TWELVE YEARS OF AGE					
4-6.	Kindness to animals. Orderliness. Good manners. Truthfulness. Generosity.	Hears stories told. Counts to ten.	Responds well to tests in odors and pitch of tones.	Plays happily alone or in groups. Helps with dressing.	Sleeps 11 hours at night. Takes nap.
7-9.	Self-reliance. Punctuality. Patience. Reasons about conduct.	Enjoys reading. Writes legibly. Memorizes easily.	Sings alone. Recognizes kinds of bird calls, etc.	Does household tasks. Dresses alone.	Sleeps 11 hours at night — regular period.
10-12.	Neatness. Personal Cleanliness. Trustworthiness.	Reads newspaper and magazines. Enjoys biography. Sense of humor.	Plays a musical instrument.	Learns "Fair Play." Develops "gang" spirit.	Sleeps 10 hours at night.
ADOLESCENCE—THIRTEEN TO TWENTY					
13-16.	Self-control. Adult manners.	Converses with adults. Reads on studious subjects.	Purposely trains senses on hikes and at school.	Begins to earn money. Keeps own room orderly. Does daily chores.	Sleeps 9 hours at night.
17-20.	Respect for parents. Reliability in all conduct.	Reads on chosen vocational and civic subjects.	Consciously continues training in sense perception.	Earns money regularly. Trains in gym or athletics daily.	Sleeps 8 hours at night.

the child's life the following items seem to be demanded:

His physical necessities are to be supplied to such an extent that needless irritation of his feelings will be avoided.

The mother or other attendant should maintain a cheerful, kindly, health-giving, manner at every contact with the infant; otherwise it will imitate the fussiness, nervousness and enmity exhibited by his elders.

in his contacts with persons and things. Few infants thrive on being passed around among a host of friends; the fatigue and confusion that result are distracting and unhealthful. Nurse maids need watching so that they may not nullify the good accomplished by parents, nor teach the child bad habits. Parents who entrust their children to a caretaker whose influence is not carefully scrutinized are abandoning a great re-

sponsibility and may spend many years in grief over their neglect.

Direct and exasperating denials of the child's requests are often avoidable. If his demands must be refused a satisfying substitute if possible should be presented so as to draw his attention away from the harmful object which he seeks.

Absolute honesty in dealing with the young child is just as essential in his first year as at any time in his life. Confidence begins to grow at birth. If it is established and maintained from the first, it will always serve as the foundation of successful child guidance.

Lessons in obedience will fully repay the effort expended. Such training in his first and second years will save the child much conflict and sorrow all through his remaining childhood. A trained parent will secure in general a happy and educative obedience without the use of physical force or any kind of trickery.

Early childhood covers the period extending from infancy to the sixth year, when the boy or girl enters school. In these years the child gains clear and enduring convictions about the character of his parents and of other members of the family. His own life patterns for conduct are largely imitations of the behavior of members of the household. The special help which parents can give will consist in showing him how to act in the particular situations which he must face: how to treat other children, to behave well at the meals, to share good things with others, to assist in keeping the home in good order, to be kind to animals, to be gentle and courteous in speech, to make concessions in cooperative undertakings, to exercise fair play in sport.

Later childhood carries us forward to the twelfth or thirteenth year. During this period school experiences occupy the child above all else. At the same time the bonds uniting the child with the home are somewhat loosened, for other sources of inspiration and of wisdom are multiplying and parents must compete with many outside agencies and personalities who also influence the child.

Child Guidance. Under these conditions guidance now requires that a vast amount of explanation be offered in support of a course of action that is recommended to

the child. But reasons for an act should never be given at the time when a direct command is uttered. A resort to compulsion in an effort to guide the child is an acknowledgement of failure in making a desired program of activity seem attractive.

The child discovers new sources of satisfaction and pleasure and his wants increase correspondingly. As a choice is necessary he needs counsel in making his selection as well as assistance in cultivating patience regarding deprivation. With the cooperation of the child let us set up a guide for making decisions on matters of conduct. It may be a case of spending the night with a boy friend. The questions to be answered may include the following:

"If I accept Tom's invitation to spend tonight in his home will I be obliged to invite Tom to spend the night with me soon? Will Tom insist on running about over town before we go to bed? What led Tom into trouble with the police four weeks ago? Will I be comfortable tonight while mother is at home greatly worried about me? Is there another friend whom I can visit without raising so many doubts?"

In this way the child may learn to solve his problems by applying his own judgment and so develop rapidly as an independent critic of his own conduct. Parents seldom discover children's ability and readiness to weigh facts because of haste in granting or refusing requests, or because problems drift to a crisis before any sufficient consideration is given to them.

Discipline and Punishment. If some failure has occurred in the child's conduct the cause should be fully explored by the parents before action on the fault is taken. With strong confidential relations established a full account of the delinquency, as he sees it, can usually be obtained from the child. Discipline and punishment can enter the picture helpfully only when the child himself acknowledges the need of stern corrective measures.

There are several theories as to the function of punishment. Among them may be found the following: punishment is needed to bring vengeance on the offender; it has a deterrent effect both on the one punished and on those who witness the infliction of the penalty and so may diminish the number of subsequent offences; punishment should induce reformation. An ideal punish-

ment would possibly accomplish all of these aims, but certainly the basic motive in punishment should be to induce the child to change his ideals, not to make him suffer. The latter purpose is uppermost in the mind of the parent who violates the cardinal rule which reads: *Never punish in anger.*

The disobedient boy who upset the milk in the pantry fears his nervous mother. Vengeance might satisfy her ill-temper, but if she understood the child's side of the story she would prefer a helpful remedy for such misconduct.

Experience with criminals seems to prove clearly that punishment in itself does not often produce reformation; when criminals do undergo a change of character some other influence has been the moving cause of the reform. Punishments will not often be resorted to in a good home.

Far more significant for molding character is the conversation that occurs within the household. Let parents narrate to each other in the child's presence how they dreaded the first day in school or how they upset the teacher's plans during the first week and the six-year-old will probably reenact these performances when he enters school.

On the other hand if the table talk is constructive, optimistic, showing kindly good wishes and high-minded attitudes towards neighbors, enterprises and government, the child will share in the spirit and in many of the sympathies of his parents.

The Adolescent Years. As the child begins to clothe himself with the habits and manners of the adult the problems of character building alter in their nature and new measures for guidance must be devised.

The adolescent child possesses far more self-confidence than formerly and he may resist the parental claims to superior wisdom. His new knowledge seems to him a discovery which the family has not accomplished or has not understood. Consequently, he will be eager to make somewhat rash applications of his learning that will test the patience of many older persons.

In view of his rapid approach to maturity parents must endeavor to put the finishing touches upon the life that probably soon will have only occasional contacts with home. It is the time for careful protection of the principles of conduct that have been implanted already in the mind of the child.

All this will call for long, and let us hope, dispassionate discussions. The child will appreciate the narratives of facts more than a warning, or an exhibition of good sense more than a tearful plea.

Methods for the Teacher. The child's conduct is the first thing that kindles the teacher's interest. There can be no successful lesson period unless the group of children is "in order." The behavior of the child is a matter under consideration by teacher and principal every moment during his presence on school property and in some cases during his entire waking day. Unfortunately school executives and teachers often treat the child's conduct and character as merely aids to the learning of lessons; their concern is to teach as much book knowledge as possible regardless of the larger interests of the children. With the new insistence upon character education that has grown up in the National Education Association and in many schools that train teachers neglect of character training is fast becoming obsolete.

If school authorities propose to reverse the process and to give character building first place in their program then the following topics need painstaking study: The character of teachers and executives and their preparation for educating children in matters of character; Developing in parents such attitudes and cooperation as will facilitate the work of the school in the effort to build character; Community trends and enterprises that may be employed in developing worthy attitudes in children; The classroom policy of the teacher; The organization and curriculum molded for character training purposes; Provision for directed activities that give the participating child training in social and civic conduct; Occasions for thorough discussion of principles of good behavior and worthy citizenship.

For the younger children learning to cooperate with their classmates in making school life a success is the most useful kind of character education. If the teacher draws out the child's interest in her plans for the school day she can also develop a strong moral force which will help each child to share in the joint enterprise.

Character Through School Duties. Scrupulous performance of learning tasks is in itself a character lesson. Hence, in guiding

these young students the teacher should envelop her teaching with a moral flavor and enthusiasm that glorify the commonest performances. To solve an arithmetic problem incorrectly is not only a mathematical error; it is an exhibition of personality insufficiency. To present a series of written exercises on clean paper with neat penmanship reveals one of the character patterns of the writer.

Occasionally the whole school may devote an hour daily for a week in the home-room or assembly periods or in certain class periods to some common purpose: cultivation of good manners, preparation of Christmas presents, elimination of unnecessary noise, putting the grounds of a sick neighbor into good order or the like.

The term "moral education" suggests to many persons a series of lessons on ethics. Books presenting such plans are available and their use has been widespread. However, reliance on such courses as the primary source of moral inspiration is often a delusion if we accept the conclusions drawn from recent careful research and experimentation. The better wisdom of individuals and committees working recently on this problem may be gathered from the manuals published by state and city school boards in New York State, New York City, Massachusetts, Boston, Maryland, Detroit, Cleveland, St. Louis, Oakland, Michigan, Missouri, Oklahoma, Nebraska, Utah, Oregon, California and elsewhere. A fusion of "instruction" with training through a study of life situations meets widespread approval.

The Department of Superintendence has published these words of wisdom:

"Character education is as broad as the entire process of education, informal as well as formal. It therefore cannot be confined to any single form of effort, as is sometimes assumed in the so-called direct method. On the other hand, the instruction which goes by this name, if it is properly correlated with the rest of the child's experience, and if it gives the child real insight instead of being mere verbal preaching, is an essential part of the education of the human being, because it recognizes his capacity for thinking. A complete plan of character education will employ all the resources at our command, both the simpler and more mechanical guidance in the formation of habits and the more distinctive

human education through the ideas and sentiments."

One of the best devices is to lay out a very rich course in home economics, manual training, citizenship, salesmanship or some other subject that has large practical connections; then in the series of teaching units certain areas may be set aside for "personality development," "family attitudes," "problems of adjustment," "learning to live with others," "setting up a family policy," "what makes a good citizen?" "how to train children." These topics will provoke ample discussion. "The highest type of conduct is that in which activity is postponed until all the issues in the situation have been impartially considered and evaluated and a rational decision as to the best course to be followed has been reached." (Percival M. Symonds.)

The skill of the teacher consists in holding inflexibly to correct moral principles while at the same time she assists the pupils to develop the most worthy courses of action without overriding their judgment. Pupils should be so managed that they will not say, "Now you know that the teacher will not like that." Such a remark proves that the moral principle governing the act has not lodged in the deeper nature of the pupils. Far happier is the day when the teacher hears one pupil after another say something like this: "I have thought this all over and my opinion is that absolute frankness about the matter is the only right thing."

School Activities. Activities conducted through various school organizations are indispensable. Dr. Hugh Hartshorne, who took a leading part in the Character Education Inquiry, has said: "Thus, if the right projects are entered upon there will naturally emerge in the minds of the children those habits of mind which lead to wholesome human relations. It is not necessary to talk about gratitude and affection. These just *are*. Character is a by-product of wholehearted, purposeful activity."

A list of organizations that may be adopted even though it is incomplete will furnish valuable suggestions to inquirers. This catalog will include clubs of every description, Boy Scouts, Girl Scouts, Girl Reserves, Boy Rangers of America, Camp Fire Girls, Four-H-Clubs, Junior Red Cross, Junior Achievement League, Inc., Knights

of King Arthur, Pioneer Youth of America, Knighthood of Youth, Pathfinders of America, School Garden Association of America, Woodcraft League of America and others.

Some specific plans which the teacher or superintendent may adopt or adapt will be found in the American School Citizenship League, the Five-Point Plan, the Four-I-League, the Iowa Plan, the School Republic, the National Honor Society the Big Brother and Big Sister Federation, and the like.

Problems to Be Solved. But these general arrangements may easily leave some urgent problems untouched. The underfed child, the child with a broken home, the defective child, the child with excessive home tasks, the problem child, raise special issues. Special workers and interested citizens must assist the teacher in preparing these children in a way that will make character training possible.

Executives and teachers will soon face a number of larger problems such as the need for fresh experimental studies in character education and for reports on achievements in other school systems, the place of religious education in public schools, the use of codes, the value and method of student government, the place to be given to political tradition and to free political thinking in teaching citizenship, a decision either to follow the standards of the community or to improve them.

Like other human enterprises character education must continue without expecting final answers to pressing questions. Social change will always affect the outlook and procedures of educators concerned with character, so that continuous study and experimentation will be required in order to render the school an efficient instrument in the culture of character.

Where insufficient provision of time or equipment seems to forbid a rich offering in character education the teacher must provide in her own personality the inspiration and wisdom that indeed in every circumstance count for more than all other resources combined. When her aims are reflected in the conduct of the pupil she may be highly gratified if her own grasp on moral principle and practice satisfies her conscience. Her position is surpassed only by that of the mother in the reach and power of her influence.

H. L. L.

Related Articles. Consult the following titles for additional information:
 Adolescence
 Athletics
 Child Study
 Ethics
 Kindergarten
 Psychology
 Story Telling
 Thrift



House of Congress, Santiago

CHILE, *che'la* or *che'le*, one of the three leading countries of South America, closely joined with Brazil and Argentina for unity of action in behalf of the whole continent. Their united purpose in diplomacy has linked them together as the "A-B-C countries." (Chile is not so fortunately situated as the other two countries named, for it is on the Pacific Ocean side of the continent, and is further separated from direct connection with the progressive part of the world by the massive range of the Andes Mountains along its entire eastern boundary.

Picture a country whose average width is less than the distance from New York to Philadelphia or from Chicago to Milwaukee, but whose land surface extends in a line 2,700 miles from north to south, with snow-capped mountain summits thousands of feet high in the east, and sea level an average of 90 miles to the west. In length the country extends as far as from Cuba to Hudson Bay, or across the United States on the 40th parallel. Such is the form and the varied surface of Chile. It has been aptly termed the *shoestring republic*.

The land area contains 285,133 square miles, which is twice as great as the area of Montana. The population in 1930 was 4,287,445, more than 3,000,000 being natives, of European descent. Chile is fourth in population among South American countries, and seventh in size.

The People. The representatives of the aboriginal people of Chile are of the race commonly known as the Araucanian, distinguished by endurance, valor and courage. The educated classes consist almost entirely of the descendants of the Spanish conquerors, and these have preserved the language, religion and social customs of Spain. Many of the inhabitants represent a mixture of European, Indian and negro blood.

Surface and Drainage. The southern portion is mountainous and is covered with

heavy forests, and it is notable for a large number of coast islands and for deep fiords which enter the continental plain. The Andes form an unbroken wall on the eastern boundary, averaging 6,000 feet in height in the south and 15,000 feet in the north.

The Chilean Andes are more heavily clad in snow than any other part of the range, and there are many glaciers, especially in the south. North of latitude 33° there is no rainfall for years at a time, and there are large deserts, among them being Atacama and Tarapaca. The region in the central part of Chile is well watered and fertile and is adapted to grazing and the cultivation of grain. The rivers of Chile are directed westward across the country. There are none of great size, the largest and the longest, the Bio-Bio, having a length of 200 miles.

Climate. The climate of Chile is exceedingly varied. In the north the climate is sub-tropical; that of the central valley is healthful and pleasant; in the southern portion it is exceedingly wet, some regions being too wet for the growth of cereals.

Mineral Resources. Chile is one of the chief mineral-producing countries of South America. The most important mineral product is nitrate of soda, which occurs in large beds in the northern deserts (see NITRATE). The deposits are not worked as much as formerly; the export is now about a million tons a year. Gold is obtained from the river sands, but the yield is not very great, being less than the silver product. Copper ores, next to the nitrates, are the most important mineral resources of the country. Cobalt and nickel are also mined, and zinc, iron, mercury and alabaster are found in small quantities.

Agriculture. The agricultural activities of Chile are mostly restricted to the great central valley. It is estimated that about one-half of the population is engaged in agricultural pursuits, but an obstacle to the development of the farming resources of the country is the rapid development of nitrate mining, which gives employment to so many of the inhabitants. The most important crops are wheat, maize and barley. Next to cereals, the most important agricultural industry is grape raising. Industrial plants, such as flax, hemp and tobacco, are also cultivated to some extent. Live stock and alfalfa are exported from the north; potatoes, flax, barley, honey, fruit and wheat from

the central part, and timber, potatoes and apples from the southern portion. The principal timber tree is the cedar; other important trees are the Araucanian pine, the beech, the evergreen and the quillaya, the bark of which is of considerable commercial importance. Cattle-raising has made rapid progress. Sheep and goats are very numerous and thrive especially in the central region.

Manufactures. Chile is not a manufacturing country. The nitrate of the north is largely shipped out of the country without undergoing manufacturing processes. In the south, where there are large German interests, there are breweries, distilleries and mills of various kinds. In other parts of the country are a few iron mills, glass factories and shoe factories. The natives cannot be induced to become factory operatives, as a rule.

Transportation. The first railway line was opened in 1852, but the construction of railroads on a large scale was not begun until 1888. The total length of railways now in operation totals about 5,500 miles, of which 3,570 miles are operated by the government. Many new railway lines are being projected. A new and important road has been opened from Arica to La Paz, Bolivia. There are regular steamship sailings around Cape Horn to Europe and others up the coast to Panama. The Panama Canal brings Chilean ports several thousand miles nearer North Atlantic ports than formerly. There are about 20,000 miles of telegraph lines and thirty-two wireless stations. There are ten wireless stations along the coast, and one has been erected to connect with Juan Fernandez Island, 400 miles distant from the mainland.

Education. Public instruction, though provided by the state, is yet in an unsatisfactory condition. It is free, but not compulsory. Secondary instruction is also offered. The state university at Santiago, the capital, gives courses in law and political science, medicine, pharmacy and fine arts, and there are, besides these, a second university, schools of agriculture, mining and other technical institutions, normal schools and military and naval academies. Sixty per cent of the inhabitants cannot read.

Government and Religion. The executive power is vested in a President, who is elected for five years by electors chosen by popular

vote; he is not eligible to reelection. He is aided by a Cabinet of six Ministers, who are in charge of the seven departments of government, and also by a Council of State of eleven members, five of whom are nominated by him and six by Congress. The legislative department consists of a Senate and a Chamber of Deputies, the former elected for six years and the latter for three. There are twenty-five provinces in the republic. The Roman Catholic Church is sustained at public cost, but other churches are tolerated. The priests possess an immense influence over the people, who look to them for aid in politics as well as in religion.

History. In 1541 the conquest of Northern Chile from the Incas of Peru was begun by Valdivia, who was successful in 1550. The Araucanians in southern Chile kept up the struggle for two hundred years and were never wholly subdued. In 1810 Chile revolted against Spain and was successful, with the aid of General San Martin, in gaining independence, which was proclaimed in 1818 and formally recognized by a treaty with Spain in 1844. In 1865 Chile and Peru were engaged in war with Spain, which lasted four years. In the war with Peru and Bolivia fourteen years later, Chile was successful and added to her territory the territories of Antofagasta and Tarapacá. There have been a few revolutions since, but none of lasting character.

In 1896 there was a serious boundary dispute between Chile and Argentina, which was happily settled. A great statue, *Christ of the Andes*, stands on the boundary line, in commemoration of the peaceful settlement of the controversy (see ARGENTINA, subhead *History*). Towards the World War, which engaged nearly the whole world, Chile announced its position as that of strict neutrality, notwithstanding the fact that the majority of South American republics had joined the allies in declarations of war upon Germany or had expressed sympathy with the allied cause. The nitrate and mining industries have produced a large laboring class, and labor disputes have taxed the government to exercise due control.

Related Articles. Consult the following titles for additional information:

Andes
Cape Horn
Concepcion
Magellan, Strait of
Patagonia

Punta Arenas
San Martin, José de
Santiago
Tierra del Fuego
Valparaiso

CHILE CON CARNE, *chil'i kon kar'ui*, a preparation of fried chicken, red peppers, salt, onions, cloves of garlic, butter and flour. The name, which is Spanish, means *peppers with meat*.

CHILLICOTHE, *chil i kahth'e*, OHIO, the county seat of Ross County, fifty miles south of Columbus, on the Ohio & Erie canal, the Scioto River and on the Baltimore & Ohio, and the Norfolk & Western railroads. The city was settled in 1802 and was the capital of Ohio from 1800 to 1810. The valley is a rich agricultural district and has extensive coal mines. The industrial establishments are railroad shops and paper mills; manufactures of pads and shoes are also prominent industries. A national reformatory is here. Population, 1930, 18,340.

CHILLON, *shil lon'*, or *she yoN'*, a castle and fortress in Switzerland, situated at the east end of Lake Geneva, on an isolated rock, standing out from the edge of the lake. It was once an important stronghold of the Counts of Savoy, and the prison house of Francis Bonnivard, prior of Saint Victor, Geneva, from 1530 to 1536. It has acquired interest from Byron's poem, *The Prisoner of Chillon*, which relates the story of Bonnivard.

CHILLS AND FEVER. See MALARIA.

CHIMBORA'ZO, a mountain of Ecuador, in the province of Quito, about 120 miles from the coast. Though not the loftiest summit of the Andes, it rises to the height of 20,703 feet above the level of the sea and is covered with perpetual snow 2,600 feet from the summit and upward. In 1880 it was ascended to the top for the first time by Whymper.

CHIMERA, or **CHIMAERA**, *ki me'ra*, in classical mythology, a fire-breathing monster, with the head of a lion, the body of a goat and the tail of a dragon. He was killed by Bellerophon (which see). To-day the word is used commonly to signify any frightful or foolish fancy.

CHIMES, a variety of music, of medieval origin, mechanically produced by the strokes of hammers against a series of bells, tuned to a given musical scale. The hammers are lifted by levers, acted upon by pins, or pegs, projecting from a cylinder, which is made to revolve by clock-work and is so connected with the striking part of the clock mechanism that it is set in motion by it at certain intervals of time, usually every hour, or every quarter hour. See CARILLON.

CHIMNEY, a structure, generally of stone or brick, containing a passage, or flue, by which the smoke of a fire or furnace escapes to the open air. The longer the chimney, the more perfect is its draught. The principle involved in the action of a chimney is that a column of heated air is lighter than a column of cool air of equal height. In the mixture of the warm and cool air, the result is that the weight of the latter forces the warm air upwards, and thus an upward movement of air is produced. Chimneys are not of great importance in warm climates, but in cooler regions the proper building and care of them require special attention.

The tallest chimney ever built is at Great Falls, Montana; it is 506 feet high and seventy-four feet in diameter at the base. It cost about \$200,000. Next in size among the world's chimneys is one in Saxony, in the old German Empire; it is 460 feet high and has a base thirty-three feet in diameter. A great kodak company in Rochester, N. Y., has a chimney 356 feet high; one in Butte, Montana, rises 350 feet, and there is one in New York City, built by a street railway company that is three feet higher, or 353 feet.

CHIMNEY SWIFT, or Chimney Swallow. See **SWIFT**.

CHIMPAN'ZEE, the native Guinea name of a large, manlike African ape, of the same genus as the gorilla. When full-grown it is sometimes about five feet high, but it is not so large and powerful as the gorilla. Its body is covered with coarse black hair, which is very long on the head and shoulders. The chimpanzee walks bent over, with its knuckles resting on the ground, though it is able to go erect. It feeds on fruits, often robbing the gardens of the natives, and constructs a sort of nest among the branches of the trees. It is common in menageries, where it shows much intelligence and docility. The chimpanzee is indeed the most intelligent of the apes. See **APE**.



CHIMPANZEE



CHINA, the largest country of Asia. Long before Greece and Rome rose to power a unique and elaborate civilization had developed in this country, and to-day it is an older nation than any of the great European powers. Yet, with all its background of antiquity, China took no part in the history of the world at large until the nineteenth century. Suspicious of the civilizations developing in other continents, confident that its modes of thought were superior to Western ideals, China through the ages and well into the modern period remained a land of mystery, untouched by the currents of progress flowing about it. Its recent awakening as a republic brought with it readjustments and a prospect of stability; but the encroachment of Japan upon its domain has recently decreased its area and is a threat to its independence.

Location, Size, Population. China occupies most of the southeastern third of Asia. As late as 1931 it consisted of China proper, with eighteen provinces; of Manchuria, to the northeast; Inner and Outer Mongolia, its hold on the latter precarious, and doubt as to the status of the former; of Sinkiang, only nominally Chinese; and Tibet, nearly independent of Chinese authority. In that year the area and population claimed by China was as follows:

DIVISIONS	Sq. MILES	POPULATION
China proper, Eighteen Provinces	1,534,420	458,778,714
Manchuria, Three Provinces	363,610	24,040,819
Sinkiang, including Turkestan	550,340	2,688,305
Mongolia	1,367,600	1,800,000
Tibet	463,200	2,000,000
	4,279,170	489,307,838

In 1932 Japan seized Manchuria and changed its name to Manchukuo; in 1933 Jehol province was taken and added to Manchukuo. In 1935 five provinces farthest northeast in China proper, adjacent to Manchukuo and the Great Wall, were lured away from China by Japanese maneuvers, with the announced intent to erect a new state sympa-

thetic to Japan. These five have an area of nearly 350,000 square miles and a population of 95,000,000. Manchuria had more than 363,000 square miles and 24,000,000 people. However, deducting these losses, China is yet the largest country on the continent, since Siberia has lost its unity by division, and it retains the largest population of any country in the world. The historical record of these momentous changes appears later in this article.

Surface and Drainage. China proper is divided into three regions—the great central plain, extending west from Peking to the Hwang, or Yellow River, and southward to the Yangtze; the western highland, from the Hwang westward to the border; and the southeastern region, which consists of lowlands and hill country. The western region is generally high and mountainous, with numerous deep valleys through which flow mountain streams tributary to the Hwang and Yangtze. In the southeastern portion there is no very high land, though the country is decidedly hilly, so that it is well drained along the valleys of the Hwang and Yangtze in the great plain. In the southeast are the most fertile regions, and it is in these that the population is the most dense and that agriculture is brought to the highest degree of perfection found in the country.

The most important rivers are the Hwang flowing in an irregular course from northeast, east, south and then northeast, and watering the northeastern portion of China; the Yangtze, which has a general northeasterly course and flows across the southern part of the country, and the Pi-Ho, which drains the region around Peiping. Each of these rivers is navigable, and all are important waterways. The Hwang has changed its lower course many times in the last few centuries, and on such occasions it has caused much destruction to life and property, earning for itself the name "China's Sorrow." Frequently floods inundate vast areas. The valleys of these rivers are densely populated. Lakes are few and small.

Climate. The greater part of China belongs to the temperate zone, but it has what is called an excessive climate. At Peiping in summer the heat ranges from 90° to 100° in the shade, while the winter is so cold that the rivers are usually frozen from December to March. At Shanghai the maximum temperature reaches 100°, and the minimum falls at

least to 20° below freezing point. In the south the climate is of a tropical character, the summer heat rising to 120°. Here the southwest and northeast monsoons blow with great regularity and divide the year between them. Among the greatest scourges of the country are the dreadful gales known as typhoons (see *TYPHOON*). They never fail to cause great devastation, though happily they always give such timely notice of their approach that preparations can be made. The Hwang and Yangtze basins have a rather equably temperature, due to the soft, moist winds of the Pacific.

Mineral Resources. China is well supplied with minerals, the most important of these being coal and iron and inexhaustible beds of kaolin or porcelain clay. The largest coal field known in the world exists in the highlands in the province of Shan-si, where extensive beds of anthracite occur. West of this province is an extended deposit of bituminous coal, and other fields are found west of the Hwang, while smaller fields, but equally important because of their location, are found west of Peiping. Coal fields also occur along the Siang and Lei river, and at various places in the valley of the Yangtze. Iron ore is found in the vicinity of the coal regions in Shan-si, as are also limestone and potter's clay.

The most important iron works in China, located across the river from Hankow, are controlled by the Japanese. In the province of Yun-nan, in the extreme southwestern part of China, are found deposits of tin, copper, silver, lead, and gold. Antimony ore is exported in large quantities from Hunan. Salt occurs in the valley of the Hwang, near the great bend where the river turns eastward, and also in the southwest part of Yun-nan. Lack of transportation facilities and the absence of suitable tools and machinery prevent the extensive development of these minerals, but 20,000,000 tons of coal are produced in average years. China also produces large quantities of tin, copper, antimony and other metals.

Vegetation and Animal Life. See *ASIA*, subheads *Vegetable Life* and *Animals of Asia*.

Agriculture. With the exception of extremely mountainous regions, all of China is covered with a fertile soil, which will admit of successful cultivation as far as 7,000 and 8,000 feet above the sea. Agriculture is the most important industry and

the one most highly venerated. Under the empire, once a year the emperor, in the presence of the highest court officials and royal family, turned a furrow and sowed some seed in the honor of agriculture. Land is divided into small holdings, the largest farms never exceeding a few acres in extent. While the most primitive methods and implements are used, the exceeding care and patience of the Chinese in fertilizing and tilling the soil assure good crops, and they obtain the largest annual yield per acre of any farmers in the world.

The land along the hills and on the upper levels is often irrigated by water from the streams. Since these hills are graded into terraces, the entire country, in many of the river valleys, has the appearance of a vast garden. The water is raised from the river by wheels containing buckets. These are operated by animal power or by men. The first wheel raises the water to the first level, a second takes it from this to the next, and so on until it has been transferred to the highest point in the district to be irrigated. From this point it is distributed through small channels, so that each section of land receives its share. The traditional veneration for ancestors interferes with agriculture, for in some sections one-sixth of the tillable area is covered with graves which must not be disturbed (see ANCESTOR WORSHIP).

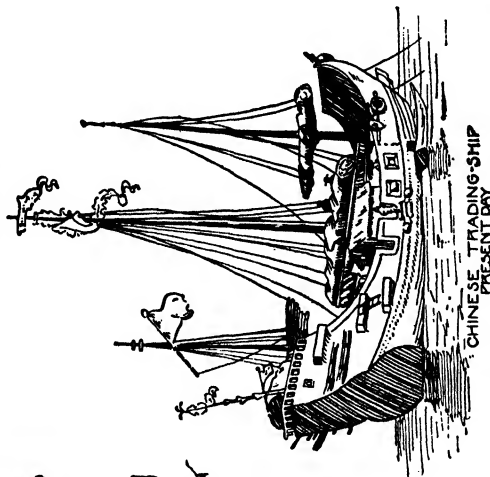
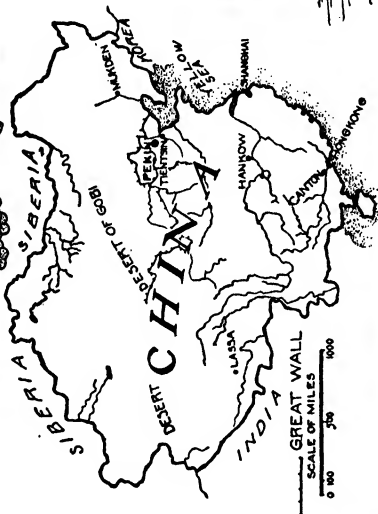
Rice is the principal food of the people and is by far the most important crop. Most of this is grown in the middle and southeastern sections of the country. In the latter, two mature crops are obtained each year, and a third crop is usually grown, which is plowed under green for manure. In the northern and northwestern sections, a variety known as dry-soil rice is cultivated like ordinary grains. In this region, also, wheat, corn and other cereals are abundant. The raising of vegetables is also an important industry. Next to rice, from a commercial point of view, the most important crops are tea and the mulberry, which is the food for the silkworm (see SILK; TEA). Ginseng, tobacco, sugar cane, indigo and numerous plants valuable for their roots are raised, and in the southern part of the country cotton is also grown to some extent.

Manufactures. The Chinese have made considerable progress in manufacture, though they were long opposed to the introduction of the tools and machinery of

progressive nations. Within recent years modern methods of manufacture have been adopted, and in certain industrial centers the manufacture of iron and steel is carried on. Modern flour and rice mills have also made their way into this land of conservatism. The leading manufactures are silk, cotton and woolen goods. Finer grades of silk are produced in China than in any other country of the world. The embroidery of silk is also carried on with remarkable proficiency, showing a high degree of mechanical skill and the finest artistic taste. Silk is the most common fabric for clothing of the wealthy classes and is prescribed for the raiment of all public officials of high rank. The poorest people also manage to deck themselves in coarser varieties—if not as a common article of apparel, at least on festive occasions. The manufacture of a fabric known as grass cloth is also important. This has an appearance of linen and is valuable in the manufacture of clothing.

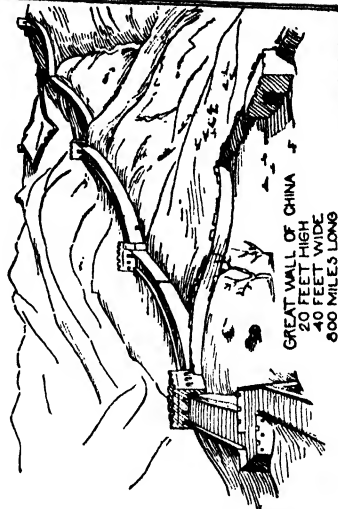
Another important industry is the manufacture of chinaware, in which for centuries the Chinese excelled all other nations, but their productions are now surpassed by a few Occidental countries. Lacquer ware is also made in large quantities. The metal work most deserving of notice consists in the manufacture of small articles, such as gongs, mirrors and statuettes in copper and bronze, and in the production of various kinds of carved and filigree work in gold and silver. The Chinese are also noted for their skill in making small articles from ivory, wood, shell and mother-of-pearl, such as card cases, seals, combs and chessmen. Many of these objects are remarkable for their beautiful carvings.

Transportation and Commerce. The inland trade of China is very extensive, so large that its amount cannot readily be estimated. The rivers and canals swarm with boats, junks and barges of all sizes. Roads in the interior are entirely lacking or are so poor that they will not admit of the passage of wagons. For this reason water communication is all-important, and the great rivers, such as the Hwang and the Yangtze, furnish the chief outlet to the sea. The Yangtze is navigable for large steamers for more than 1,100 miles and for smaller boats for a considerable additional mileage. The Grand Canal connecting Hankow with Tien-tsin, 700 miles long, has been in use since the eleventh century and is still an im-

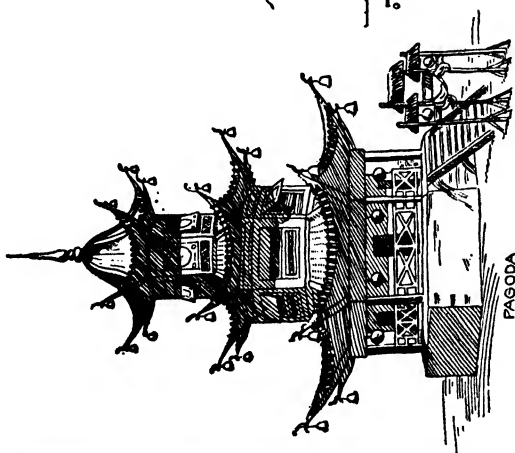


CHINESE TRADING SHIP
PRESENT DAY

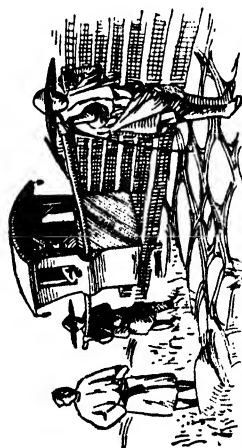
CHRONOLOGICAL SUMMARY	
MIGRATION OF CHINESE FROM THE WEST, ABOUT.....3000 B.C.	
CHOW DYNASTY FOUNDED.....1122 B.C.	
PHILOSOPHER LAOTZE BORN.....600 B.C.	
PHILOSOPHER CONFUCIUS BORN.....551 B.C.	
T'ANG DYNASTY FOUNDED.....618 B.C.	
GREAT WALL BUILT.....5TH CENTURY	
BUDDHISM INTRODUCED FROM INDIA.....100 A.D.	
T'ANG DYNASTY FOUNDED.....618 A.D.	
MANCHU DYNASTY FOUNDED.....1644 A.D.	
REPUBLIC OF CHINA ESTABLISHED.....1912 A.D.	
THE CHINESE WERE THE INVENTORS OF GUNPOWDER AND OF THE ART OF PRINTING.	



GREAT WALL OF CHINA
25 FEET HIGH
40 FEET WIDE
600 MILES LONG



PAGODA



PAL ANQUIN—COMMON MODE OF TRANSPORTATION

portant waterway. Considering the extent of the country, railroads are few. In 1936 there were about 6,600 miles in operation; 2,200 miles in Manchukuo are lost to China. In 1935 arrangements were made for China to sell its slight interest in the railroads leading northward into Mongolia and Manchukuo. The line here of greatest importance is the Chinese Eastern Railroad. Civil war, Japanese infiltration, and currency changes in recent years have prevented much-needed railroad building and has seriously delayed this important development.

The foreign commerce of the country amounts to over \$1,000,000,000 a year. Of this more than half is in imports. Cotton goods are the chief imports, silks the chief exports. The foreign commerce is carried on through what are known as treaty ports, cities specially opened by government decree to foreign trade. There are forty-eight such cities, some of them inland on the rivers.

Spheres of Influence. The leading nations in foreign trade are Japan, Great Britain, United States, Germany and France. Because of the tendency of the Chinese to retain all the customs of their ancestors, customs which are so far removed from modern business methods as to greatly impede commercial transactions, the leading European nations have secured special privileges extending over certain territories. These are known as spheres of influence. Previous to the Russo-Japanese War Manchuria and Port Arthur were practically under Russian control. Hong-Kong island and its city, Victoria, are owned by Great Britain. Until the World War the region around Kiaochau was under German influence. The spheres of influence are not controlled by foreign governments, but within them each government is granted special concessions, which give its citizens advantages over those of other foreigners.

The People. The Chinese belong to the Mongolian race, but they do not represent the harsher features of this race, as found in the genuine Tartars. They are of low stature, have small hands and feet, a dark complexion, wide forehead, straight black hair and eyes and eyebrows obliquely turned upward at the outer extremities. The queue, formerly in use, has now long been discarded. They are inferior to Europeans and Americans in bodily strength, but are superior to most other Asiatics in their physical endurance. They have many excellent moral quali-

ties, are strongly attached to their homes, hold age in respect, are unusually industrious and toil continually for the support of their families. In the interior, where they have not been corrupted by contact with foreign nations, they exhibit remarkable simplicity of manners. However, the Chinese are not free from vices. They are noted for treachery and for their untruthfulness in dealing with strangers. They are exceedingly polite in their intercourse with one another, but this politeness often lacks sincerity. Gambling is a universal vice among them. Opium smoking has been materially lessened through government intervention. See illustration facing article TRANSPORTATION.

Their food consists largely of rice, fresh pork, fish, fowls and vegetables. Beef and mutton are seldom used. Tea is the universal beverage and is drunk in large quantities. Among the poorer classes the larder includes seaweed, fungus growths, silkworms, rats, cats and even refuse.

With rare exceptions, the men and women of the household are kept strictly separate. Marriage is universal and is provided for at an early age, and the negotiations are conducted by parties who devote themselves to match-making. The marriage ceremony is characterized with gay processions and other festivities. While polygamy is not sanctioned by law, it is often practiced. Women are considered far inferior to men, and except in the coast cities, have practically no social or educational advantages. Among the poor, in the interior, baby girls are sometimes killed soon after birth. The cruel practice of binding the feet of girls is on the wane.

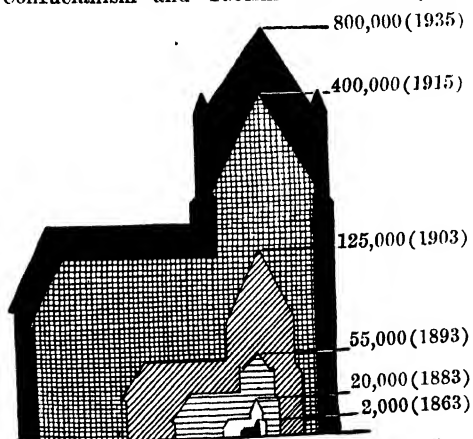
The houses are usually of one story and built of bricks, earth or thatch, with brick tiling for a roof and wood for the interior. The interior contains a series of rooms which are separated and lighted by intervening courts and communicate with one another by side passages. In the best houses there are chambers set apart for the worship of ancestors, and in these religious ceremonies are regularly performed.

Government. From the beginning of history until our own time China was an empire, more or less absolute according as the ruling sovereign was strong or weak. The crown was nominally hereditary through the eldest son, but it was not unusual for the emperor to designate as his heir a younger

favorite son or some other near relative of marked ability. The emperor was honored and worshiped as the "Son of Heaven," and in matters of legislation and administration his authority was supreme, except that his actions must conform in a general way to certain principles laid down in the sacred books of Confucius. As a matter of fact, however, the government was a bureaucracy; the governing class was composed of Manchus. While the officials were compelled in theory to obey the emperor without hesitation, in practice they were allowed considerable freedom, and thieving, extortion and oppression were characteristic of the administration.

After various attempts to reform the government proved of little avail, a republic was established in 1912 and the Manchus driven from power. In 1914 a permanent constitution was promulgated. The executive power was vested in a President to be assisted by a Cabinet of nine members. In case of his death he was to be succeeded by the Vice-President. The Premier, or head of the Cabinet, was nominated by the President; the other Ministers were named by the Premier. Strife between factions resulted in civil war and since 1922 only the shadow of representative government in China has been in evidence.

Religion. The principal religious beliefs are Confucianism, Buddhism and Taoism. Confucianism and Taoism were developed



GROWTH OF PROTESTANT CHURCHES

The diagrams graphically portray the increase in membership among the native population.

within the country, but Buddhism was introduced from India. Christian missiona-

ries are usually tolerated, although occasionally some of them are murdered by anti-foreign fanatics. There are nearly two million followers of the Roman Catholic faith, and various Protestant denominations have established missions. In 1935 the Protestant churches had a membership of 800,000. Mohammedanism is represented by 10,000,000 persons. Under the old empire Confucianism was practically a state religion, and the emperor, as the Son of Heaven, publicly practiced the sacred rites of the worship of Heaven. Yuan Shi Kai in 1914 attempted to restore this official worship, but he was unsuccessful.

Education. Formerly an education in the Chinese classics was considered the ideal of all educated Chinese, and special classes were held to give instruction in philosophy and literature. Examinations were held frequently and successful candidates were awarded degrees which entitled them to hold civil service positions. This system was abolished in 1905, and an attempt was made to introduce general education according to Western methods. As yet about ninety-six per cent of the people can neither read nor write, but the government is endeavoring to remedy this condition. Primary and secondary schools leading to institutions of higher grade have been established, and the University of Peiping is at the head of the entire system. Tien-tsin has a university, an Anglo-Chinese college and a number of special schools. There are about 110 schools for higher learning in all China, of which 47 are universities. Not far from 5,000,000 pupils are enrolled in schools of all grades; 110,000 are in mission schools.

Cities. China contains a large number of great cities, but most of these are merely aggregations of people, and only a few are of political or commercial importance. Among these are Peiping (Pekin), Hankow, Tien-tsin, Canton, Shanghai, Nanking, the present capital, and Hong Kong (British).

Language and Literature. The Chinese language is the most important and most widely spread of the so-called monosyllabic languages of Eastern Asia, in which each word is uttered by a single movement of the organs of speech. There is no alphabet, and each word is represented by a single symbol or character. The same word may stand for a number of different ideas, and its exact meaning must be decided by its position in

the sentence. There are also certain words which are attached to other words to show grammatical relations. As there are only about five hundred simple syllabic sounds in the Chinese language to do duty for a vastly large number of ideas, a system of tones is employed. Some sounds may be pronounced in as many as eight different tones, each of which has a different meaning; and it is this system of tones which makes the language so difficult for a Westerner to learn. The written characters in the Chinese language were probably originally hieroglyphics, or rude copies of the objects designed to be expressed by them; but the hieroglyphic features have almost entirely disappeared, and many of the symbols are formed of what seems to be an arbitrary combination of lines. Most of the written characters are formed by a combination of the old ideographic element with a phonetic element. In writing or printing, characters are arranged in vertical columns, to be read from top to bottom.

The Chinese are a distinctly literary people, and their literature is unquestionably the most important of Asia. It dates back perhaps to the twentieth century B. C., but the first important volume of which we have knowledge was written in the twelfth century B. C. This was one of the "Five Classics," or *King*, which formed the oldest and one of the most important parts of Chinese literature. The "Four Books," written by Confucius and his disciples, are next in value to the earlier "Five Classics." Among the most important works which have been produced in China are the historical and geographical works, and writings on the sciences and on philosophy are also numerous. There are, too, voluminous collections of poetry and numerous dramas and novels which have never been made known to Europe.

History. The early history of China, which, according to some authors, reaches back for hundreds of thousands of years, is enveloped in mystery; and not until the twenty-seventh century before the Christian Era was there a ruler of whom we have any record. Even of this ruler little is known beyond the fact that he built roads and organized the empire into administrative departments. With the reign of Yao in 2356 B. C., Confucius begins his record, and although his statements cannot be taken for authentic historical information, his accounts

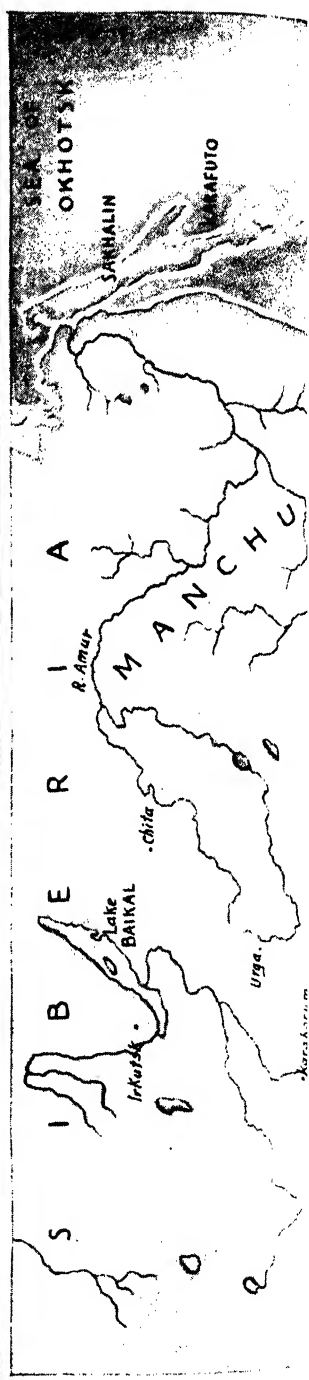
of Yao and his successors, Shun and Yu, give a general idea of the epoch. These kings greatly extended the empire and ruled so well and so justly that they have been regarded as the model for all rulers since their time. Their successors lacked their virtues, however, and by 1766 B. C. a new dynasty had arisen, known as the Shang dynasty. The most of the rulers of this line, which reigned until 1154 B. C., were unfitted for ruling, and the country prospered little under them. Better times came to the empire with the accession of the Chow dynasty in 1122 B. C. It is certain that under this dynasty internal improvements took place in the country; the people changed generally from their former nomadic life to a settled agricultural existence, and civilization reached a comparatively high point for that early date. It was during this dynasty, about 551 B. C., that the great Confucius was born. Internal feuds disturbed the empire, and by 255 B. C. the Chow dynasty was overthrown by the Tsin or Chin dynasty, from which China takes its name.

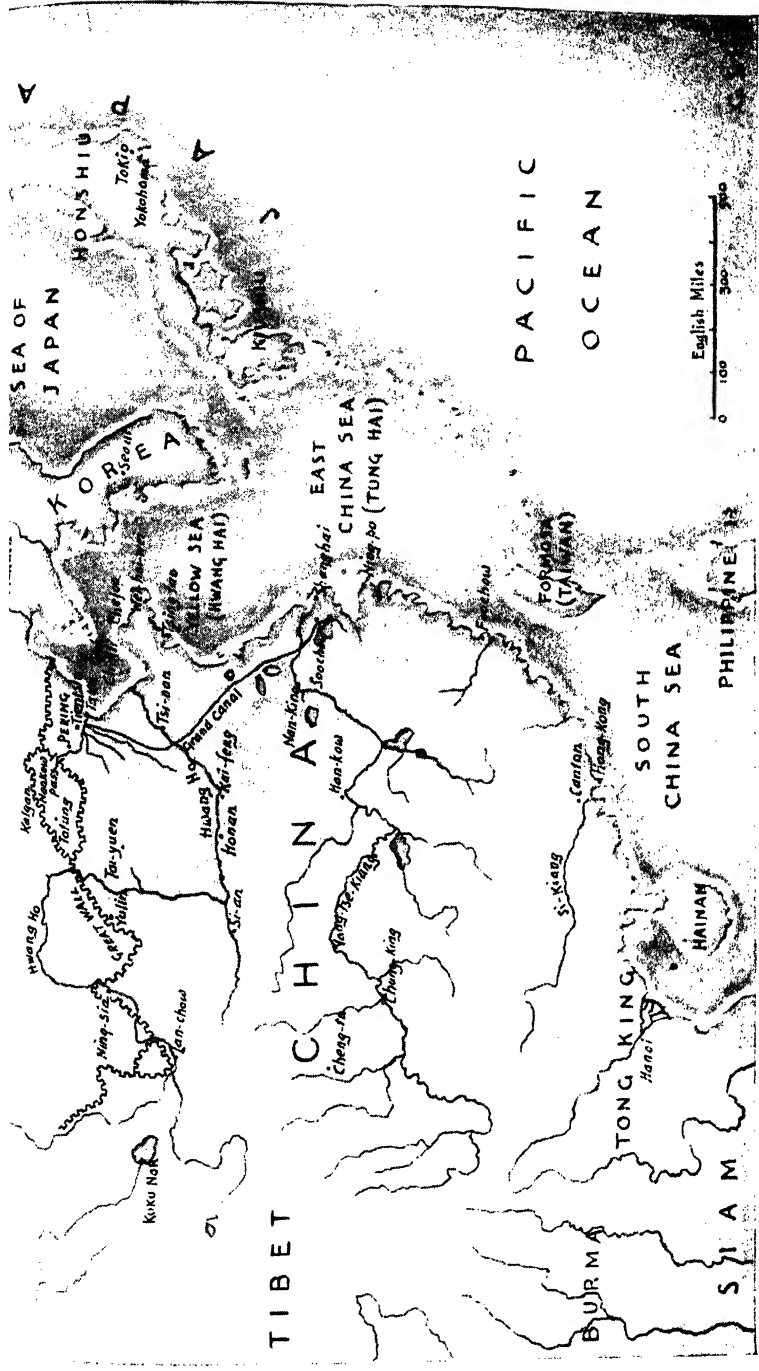
One of the rulers of this line, wishing to have his own reign go down in history as the beginning of the empire, destroyed all the literature which dealt with previous ages and had over four hundred learned men buried alive that they might not produce new records. He was defeated in his project, however, by the fact that the books of Confucius were discovered later. It was during the Tsin dynasty that the great Chinese Wall was erected to keep out the Tartars. From the days of the Tsins a number of dynasties have ruled China, some of which brought the country to a very high point. Under the Tang rulers learning was especially cultivated. In A. D. 924 printing was invented, and the practice of binding the feet of the women was introduced at about the same time.

In the thirteenth century the Mongols overran China and established the Mongol dynasty. Kublai Khan, the most famous of the Mongol rulers, brought China to a point of splendor which it had never attained before. During his reign Marco Polo, the Venetian traveler, visited China and brought back accounts of the high state of civilization which it had attained. Under the reign of the Ming dynasty, which ruled from 1368 to 1644, the Portuguese visited China and settled at Macao. Under the last half of



THE GREAT WALL





SHI-HWANG-TI (First Emperor)
Began the building of the Great Wall

this line internal affairs in China became greatly disturbed. Rebel bands throughout the empire menaced the throne itself, and finally, to put down these rebels, the Manchus were invited into the country. They did indeed put down the rebel armies, but when their object was accomplished and the Chinese wished them to retire, they refused to do so. They took possession of Peking and proclaimed a Manchu prince emperor, thus founding the last royal dynasty of China. Opposition to the new rulers gradually died out, and the conquerors, who were of course greatly inferior in numbers to the conquered, were gradually merged with the original inhabitants of the country. Almost the only custom which the Manchus forced upon the Chinese was the wearing of the cue, or pigtail. The most famous of the Manchu emperors was Kang-hi, who reigned from 1662 to 1722. He was no less remarkable as a scholar than as a general, as is proved by the dictionary of the Chinese language which was published under his superintendence. Tibet was ceded to the emperor during his rule, and the country was exceedingly prosperous. The one great disaster was the earthquake at Peking, in which, it is said, 400,000 people were killed.

From its earliest days China has shown an unconquerable aversion to intercourse with other countries. As long, however, as English trade relations were conducted through the East India Company, matters were generally satisfactory, because the Chinese, unable to understand the political standing of the company, treated with them as with a company of merchants with whom no diplomatic relations were necessary. When in 1834 the monopoly of Chinese trade was taken from the East India Company and the British merchants were represented in China by a commissioner appointed by the British government, misunderstandings at once arose. The opium trade was the chief cause of disagreement. All traffic in opium had been decreed illegal by the Chinese government, but the decrees had never been strictly enforced. When, however, in 1837, the Chinese government did determine to enforce its edicts, the British government, to whom the opium trade was worth millions of dollars annually, refused to act with China. As a result, war broke out in 1840. The struggle was most disastrous for China, and in the treaty of peace which was signed in

September, 1842, the English were given permission to trade freely at Shanghai, Ningpo, Fu-chow, Canton and Amoy and received Hong-kong, besides an indemnity of \$21,000,000. No mention was made of the opium question. Two years later the United States and France each succeeded in making a trade treaty with China, similar to the one which Great Britain had made.

In 1856, as China refused redress for certain grievances of Great Britain, war again broke out between the two countries. France joined England, and the struggle was not terminated until 1860, when the allied armies took Peking. This war, which, added to internal troubles, had seemed an unmixed calamity, proved to have its compensations, for the foreign powers after the treaty with China showed themselves ready to help her in putting down a severe rebellion which had arisen in the empire. Hung-siu-tseuen, a schoolmaster who through reading Christian tracts had grasped some idea of the Christian religion and had convinced himself that he was a Heaven-sent ruler, headed a rebellion which in the three years after 1850 reached great dimensions. The rebels had seized Nanking, which they had made their capital, and Hung-siu-tseuen had had himself proclaimed the founder of a new dynasty, to be called the Peace dynasty. A small army, under the leadership, first, of an American, Ward, and later, under the leadership of Charles George Gordon, finally succeeded in putting down the rebellion, which is generally known as the Tai-ping Rebellion (see GORDON, CHARLES GEORGE).

The ten years that followed witnessed a general revival of the strength of the empire. In 1894 China became involved in a war with Japan (see JAPAN, subhead *History*). Difficulties in Korea, over which China claimed suzerainty, led to the interference of the two powers, and their inability to agree as to the future government in Korea at last brought on open war. China was completely defeated in the struggle and was forced, in 1895, into a treaty which ceded to Japan the island of Formosa and the peninsula of Liao-tung, on which was situated Port Arthur, China's strongest fort. China also promised the payment of an indemnity of about \$150,000,000. The European powers, especially Russia, were by no means willing to have the Liao-tung peninsula given up to Japan. Russia herself had been for years

very anxious to gain possession of an ice-free port for her Siberian territory, and Port Arthur seemed to offer the most favorable outlet. In conjunction with France and Germany, therefore, she brought such pressure to bear upon Japan that she gave back to China all of the ceded territory except the island of Formosa. Russia, as the price of her interference, obtained special privileges, among them a lease of the city of Port Arthur.

For a time after the close of the struggle with Japan, it seemed as if the reform party in China might gain the upper hand and bring China into a closer relationship with other nations. The great influence of the empress dowager, however, finally made reactionary measures prevail, and anti-foreign demonstrations broke out in many parts of the country. By decree of the emperor, practically all power was placed in the hands of the empress dowager, and it was generally felt that she was encouraging, tacitly, at any rate, the outbreaks in various parts of the empire. In Shan-tung the organization popularly known as the Boxers became active. The origin of this movement is obscure. Its name is derived from a translation of the Chinese name, "The fist of righteous harmony," and it appears to have been originally a secret association of men chiefly from the lower classes. It is not known whether the empress and her advisers deliberately turned the revolutionary movement into channels where it would work against the foreigners, rather than against the imperial government, or whether they carelessly allowed it to grow until it was beyond their control; at any rate, even when the Boxers carried about banners on which were inscribed, "Exterminate the foreigners and save the dynasty," the representatives of the powers at Peking were able to secure no measure against them.

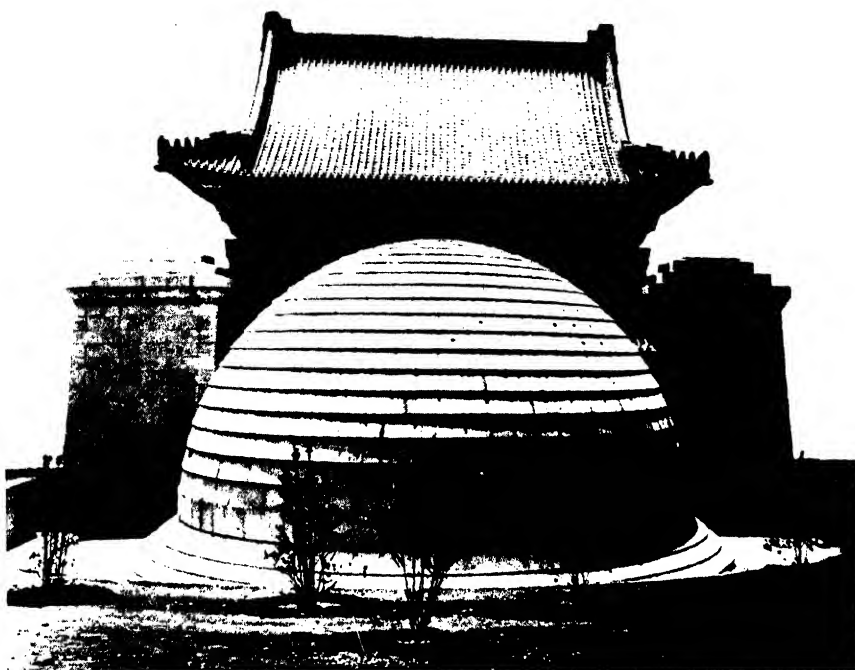
Matters went from bad to worse. In May 1900, a number of Christian villages were destroyed, and many native converts were massacred in the neighborhood of the capital. In June, the chancellor of the Japanese legation was murdered, and later in the same month the German ambassador, Baron von Ketteler, was assassinated. The foreign representatives, with their households and guards, collected in the British legation, which they fortified, and here they were besieged by the Chinese troops. Not until the

fourteenth of August did the allied forces of Japan, Russia, England, America and France reach Peking and relieve the legations. For further details, see **BOXER REBELLION**.

The political unrest next showed itself in a demand for constitutional reform, and on September 20, 1907, an imperial edict announced a plan for a national assembly. While this and other promised reforms only added strength to the demands for complete representative government, the more extreme reformers had been preaching revolution against the Manchu dynasty. In October, 1911, rioting broke out in Wuchang, on the Yangtse River opposite Hankow, in connection with a great railroad strike. Imperial troops were sent to enforce order, but their presence furnished an excuse for a general uprising against the Manchus. Yuan Shi Kai, who had been appointed Prime Minister in an attempt to save the dynasty, tried to compromise with the revolutionists, but failed. The imperial family and most of the high Manchus left Peking.

The Republic. The conviction that the Manchu dynasty must come to an end was driven home to the court by the organization of a provisional republican government, under the presidency of Dr. Sun Yat Sen, an educated and widely-traveled patriot, who had urged revolution against the Manchus as early as 1896. An agreement was reached between the republicans and the imperialists by which Yuan Shi Kai should succeed Sun Yat Sen as provisional President. This change was made in March, 1912, and the republic was regularly established.

As President, Yuan Shi Kai naturally wanted the constitution of the republic to provide a highly centralized government, with great power in the hands of the President, but it was not until he had quarreled with the new national assembly and had dissolved it that he had his way. Under this constitution he became, on October 10, 1913, the first regularly elected President of the republic. His position was no easy one. He had already, in the July previous, suppressed a serious revolution in the southern provinces, he had great difficulty in meeting the expenses of government, and he was forced to make great concessions to foreign powers in order to borrow money abroad. At the same time Russia in Mongolia and Great Britain in Tibet were demanding recognition of their interests, and except for a shadowy



Pacific & Atlantic



Underwood & Underwood

CHINA

Above: Tomb of Sun Yat Sen, revered hero of the Chinese revolution and first President of the Republic, on top of Purple Mountain, Nanking.

Below: Harbor of Hankow, one of the most prominent river ports.



Acme



Wide World

CONTRASTING TYPES OF LIFE IN CHINA

Above: The Bund and Harbor at Canton, showing the famous house boats, in serried ranks, attached like barnacles to the shore.

Below: Nomad life in Mongolia. The Kirghiz, a race of wanderers, live in round tents, made of felt, supported by a reed framework.

form of suzerainty northern or Outer Mongolia and western or Outer Tibet were lost to China. The outbreak of the World War, in spite of Chinese proclamations of neutrality, involved the violation of Chinese territory, as the Japanese forced the Germans to surrender Kiaochau. Throughout these troubles it became increasingly clear that China was a republic only in name, and that Yuan Shi Kai was practically an absolute ruler.

Yuan Shi Kai died in 1916, and was succeeded by Li Yuan-hung and Feng Kwo-chang, in turn. Hsu Shi-chang was elected in September, 1918. China joined the allies in the World War, but made no contribution of military forces. Japan's occupation of Shantung after the war aroused ill feeling, and under the pressure of world opinion it was returned to China by agreement made in Washington in December, 1922. The Peking government proved unstable, it being opposed by strong factions, especially those in South China, led by Dr. Sun Yat-Sen. Li Yuan-hung was again called to the presidency in June, 1922, but civil war brought defeat to his forces and he fled from Peking in June, 1923. Following a Regent Ministry led by Dr. Wellington Koo, Parliament elected General Tsao Kun president, and he was inaugurated in October. Civil strife continued. Attempts were made to remake the constitution, but conflicting ambitions and jealousies of strong military leaders frustrated all efforts. In 1928, the Nationalist Party established control of the government under Gen. Chiang Kai-shek, and removed the capital from Peking (Peiping) to Nanking. A skeleton of government was erected, a central executive council assuming legislative and administrative functions. Gen. Chiang Kai-shek attempted to unify the nation but met with strong opposition from the "war-lords" of certain provinces, although Manchuria for a time acknowledged the leadership of the central government at Nanking. Opposition developed in Canton, which declared its independence, and Communist propaganda threatened control of the western provinces. In 1931 Japan declared its interests in Manchuria were endangered by failure of China to protect its nationals, though the Japanese there numbered only about 100,000 among 24,000,000 people. On the pretext named, Japan's army occupied the country, renamed it Manchukuo, and established China's for-

mer boy emperor, Henry Pu-yi, on the throne; he assumed the dynastic name of Kang-teh. In 1933 Manchukuo's area was increased by the seizure of Jehol province, lying southeast. Japan's penetration was marked again in 1935 when five of China's most northerly provinces were induced to revolt and set up an independent government sympathetic to Japan. This plan did not at once come to fulfillment, for the leaders of some of these provinces insisted upon referring vital matters to the Nanking Nationalist government for decision instead of accepting advice and guidance solely from the Japanese usurpers. Within a year, however, Japanese influence was so overpowering that it was evident these provinces were permanently lost to China.

China's ultimate fate is unpredictable. There are observers who profess to see in this Japanese penetration a fixed purpose to possess the entire Chinese nation as quickly as possible, or at least be able to dictate the policy of the government.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Altai Mountains	Kiao-Chau
Amur (river)	Manchuquo
Amoy	Mukden
Canton	Nanking
Pu-chow	Ning-po
Hang-chow	Peking
Hankow	Shanghai
Himalaya	Tien-tsin
Hoang-ho (Hwang)	Yalu River
Hong Kong	Yangtze (Kiang)

HISTORY AND RELIGION

Boxer Rebellion	Great Wall of China
Buddhism	Li Hung Chang
Chinese Exclusion	Mohammedanism
Chinese-Japanese War	Taoism
Confucianism	Yuan Shi Kai

CHINA PAINTING, a form of art that has become very popular with amateurs in recent years, and has also proved a profitable vocation for professionals.

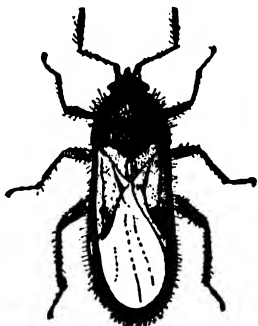
The equipment demanded in china decoration includes mineral paints, a medium for mixing with the colors to make them work smoothly, and various kinds of brushes. The bases of mineral paints are metals, and the paints are of such a nature that when the china is subjected to intense heat in the kiln the colors become an inseparable part of the material.

Before the actual painting is done, an outline must be sketched on the article to be decorated. In many cases the outline is transferred to the china by means of tracing paper. To one who is unskilled in free-hand drawing this step of the process is

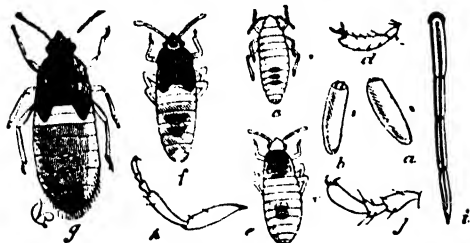
essential. As mineral paints are transparent, the strokes taken must be sure and accurate, and the working over that may be done with oils must be eliminated.

The firing of the decorated article is a very important part of the process, and requires both skill and experience. A model kiln in common use is made of metal and lined with firebrick. Kerosene, gas, gasoline and charcoal are used as fuels. The kiln is cooled off when the china takes on an ashy-red tint, and the latter is not removed until it has thoroughly cooled.

CHINCH BUG, the worst insect pest known to the wheat raiser. It is widely distributed, appears every year and in favorable seasons multiplies to such an enormous extent that it attacks all grains and most of the forage plants. Rarely is there any serious injury done during years when an abundance of rain falls, and often a period of wet weather quickly exterminates the insects for that year. The chinch bug is small and blackish and belongs to the same class with the squash bug. The female lays many eggs, each of which is cylindrical and squarely cut off at one end. The newly hatched insect looks much like the mature bug and is pale reddish in color, with a yellow band across the abdomen. The insects begin feeding at once, climbing the stem of the plants and keeping together in



Adult, much enlarged.



CHINCH BUG

a, b, eggs; c, newly hatched larva; d, tarsus; e, larva after the first shedding of its skin; f, the same, after the second molting; g, the pupa; h, enlarged leg of the perfect bug; i, tarsus of the same, still more enlarged; j, beak.

great masses, moving on whenever the food

is exhausted. Two broods are raised in a year, and the number of insects appearing some seasons is beyond computation. They move sometimes a quarter of a mile or more at a time, crawling over the ground and feasting on whatever comes in their way. It is thought that \$20,000,000 would not cover the annual damage of these bugs.

Their spread can be prevented by making a barrier of tar around a field, or by digging holes, into which the insects fall and are destroyed, or, still better, by burning waste grass and refuse near the fields in the fall, as here the bugs hide during the winter.

CHINCHILLA, a South American animal very closely allied to the rabbits, which they resemble in the general shape of the body and in the fact that their hind legs are longer than their fore legs. One species,



CHINCHILLA

about fifteen inches long, is covered with a beautiful pearly-gray fur, which is of great value. The chinchilla lives in colonies in the mountains of most parts of South America, makes numerous and very deep burrows and feeds on roots and tough vegetable growths. It is of a gentle, sportive nature.

CHINESE IMMIGRATION. Among white people there is a distinct aversion to the presence of Chinamen in their midst in large numbers. In some communities the presence of even an occasional yellow man is resented. There are several reasons for this attitude:

(1) A Chinaman resists the "melting pot;" he will not conform to the customs of the country of his temporary residence.

(2) He emigrates to acquire money where it is more easily earned than at home, expecting to take it back to China within a few years.

(3) He will work for a wage which would mean literal starvation for white men. (This is the main indictment against him among laboring men.)

(4) Prejudice is strong against him because of stories generations old regarding habits

which are filthy from Anglo-Saxon standpoints—that he eats rats, for example. His strange clothing and his pigtail, not longer prescribed, excite derision and fan the prejudicial flames. That his diet of rats is a slander except when facing starvation does not favorably influence public opinion.

Soon after the year, 1875, there was a large increase in Chinese immigration to the United States; the Western states felt its economic effects so severely that in 1879 Congress passed a law aimed at restriction of Chinese immigration. President Hayes vetoed it, because it violated the Chinese-American treaty of 1868. The next year a new treaty gave the United States the right to regulate, limit or temporarily suspend the reception of Chinamen in the republic, but not the right absolutely to prohibit for all time such immigration. In 1882 it was suspended for ten years; in 1892 the suspension was extended another ten years, and Chinamen already in the United States were forced to secure certificates of residence. In 1892 the law was indefinitely extended—until further enactment should be made.

After the World War had been in progress two years, the shutting off of European immigration and the drafting of men into America's armies seriously affected labor conditions in all parts of the country. The supply of laborers was far below the demand. For a time it was thought probable that Chinamen would have to be invited to America in large numbers to fill the depleted ranks of common labor. The sudden ending of the war, however, relieved conditions.

The Federal Census of 1930 reported 74,954 Chinese in the United States.

CHINESE-JAPANESE WAR, a war fought in 1894-1895 between China and Japan. It was caused by a dispute between the two powers concerning their conflicting interests in Korea (now Chosen). The war began in July, 1894, and ended on April 17, 1895, with the signing of the Treaty of Shimonoseki. Japan was the victor in the struggle. By the terms of the treaty, the island of Formosa and the Liaotung peninsula were ceded to Japan, and China agreed to pay an indemnity of about \$150,000,000. Through the interference of the European powers Japan was forced to cede back Liaotung, with Port Arthur, to China, but the Japanese won it later through their war

with Russia. In 1910 Korea was formally annexed to the mikado's realm, and renamed.

CHINOOK', the name of a warm, dry wind which blows over the Rocky Mountains in Montana and Wyoming and some of the Canadian provinces. It is supposed to have taken its name from the Chinook Indians, as the early settlers of this region thought that it came from the territory occupied by them. The chinook is caused by the descent of the current along the mountain slopes. As the air descends it becomes warmed by compression, and a descent of 5,000 feet will raise the temperature about 30°. Previous to its passing over the mountains the air has been robbed of its moisture, so that in its beginning the chinook is a dry wind and as its temperature is raised its capacity for moisture is increased; consequently, it melts the snow and clears the sky. The chinook occurs during the winter and early in the spring, and makes it possible for stock to graze in these regions during the entire winter. The hot winds of Kansas and Nebraska probably originate from a similar cause, and the wind in the Alps, known as the *Föhn*, is similar to the American chinook.

CHINOOK, the name of a tribe of Indians now extinct, but once strong and important in their home near the mouth of the Oregon. There they built large canoes and fished in the sea. Many words of their language are still in use in the *Chinook jargon*, a medley of English, French and Indian words that is the language of the traders among tribes farther north.

CHIPMUNK, the popular name in America for several small squirrels, but especially for the small, striped ground squirrel. This animal is about six inches long, reddish-brown in color, with black and white stripes along its back. It is a cheery, friendly little creature, so very curious that it will approach very close to a person and sometimes will even fearlessly explore the clothing. Its shrill notes of alarm often attract attention, when it would remain wholly unseen if it kept quiet. Its food consists of nuts and grains, which it stores up for winter use.

CHIPPENDALE, THOMAS (1718-1779), an English (London) furniture designer whose fame endures in the style of cabinet work that he originated. So excellent was the work of some of his imitators that it is diffi-

cult to determine those pieces that came from his own workshop; only those are known to be his for which original invoices still exist. Chippendale's furniture was frequently of intricate design, characteristically beautiful, and always of enduring construction. His genius extended to chairs, tables, cabinets, and book-cases; especially did he promote a vogue in sideboards which became the established English form of those articles. He used dark mahogany, without inlays.

CHIPPEWA. See OJIBWA.

CHIPPING SPARROW, or **CHIPPY**, a small American sparrow, so called because its trilling notes sound like the syllables *chippy-chippy-chippy*. It is a gentle, friendly little creature, and is a destroyer of harmful insects. The bird has an ashy-blue breast and a chestnut cap. Its nest is made of grass and roots, and contains four or five eggs, which are blue, speckled with blackish-brown at the larger end. Two or three broods are raised in a season. See SPARROW.

CHIROMANCY, *ki'ro man si*. See PALMISTRY.

CHIRON, *ki'ron*, the most famous of the Centaurs, a race fabled as half men, half horses. He lived at the foot of Mount Pelion, in Thessaly, and was celebrated through all Greece for his wisdom and for his skill in medicine and music. See CENTAUR.

CHIROPRACTIC, *ki ro prak'tik*, **HEALING**, a method of treating disease, introduced into the United States in 1895 by Dr. D. D. Palmer. It is based on the theory that vertebrae become displaced and cause pressure upon the nerves which pass to different parts of the body from the spinal cord, through the openings between vertebrae. This pressure, by interfering with the passing of nerve impulses, may be the cause of disease. In chiropractic treatment the practitioner, by certain manipulations by hand, seeks to replace the displaced vertebrae and restore the patient to health. About 5,000 American practitioners use this method, and the treatment is taught in a number of institutions.

CHIROPTERA, *ki rop'te ra*, an order of mammals which have more or less the power of flight. The most common example is the bat (which see). The fingers of the fore limbs are greatly elongated and carry, between these and the hind limbs and tail, a thin membrane which forms the wings. The

bones are slender and filled with a light marrow; this lessens the animal's weight. The ears are often large in proportion to the size of the animal; its sense of hearing is remarkably acute.

CHITONS, *ki'tonz*, a large family of mollusks whose shells consist of many successive portions often in contact with, and overlapping, one another, but never truly joining. The shell in the typical chiton is composed of eight pieces, and the animal adheres to rocks or stones after the fashion of the limpet. The largest known are found along the California coast, and are eight or ten inches long.

CHIVALRY, *shiv'al ri*, a term which indicates strictly the organization of knighthood as it existed in the Middle Ages, and in a general sense the spirit and aims which distinguished the knights of those times. The education of a knight in the days of chivalry was as follows: When he was seven years of age he was sent to the court of some baron or noble knight, where he acquired skill in the use of arms, in riding and in attending on the ladies. When his age and experience in the use of arms had qualified him for war, he became an esquire or squire and accompanied his lord in battle. The third and highest rank of chivalry was that of knighthood, which was not conferred before the twenty-first year, except in the case of distinguished birth or great achievements warranting the highest public commendation.

The person to be knighted prepared himself by confessing, fasting and keeping vigil all night over his arms; religious rites were performed, and then, after promising to be faithful, to protect ladies and orphans, never to lie nor utter slander, to live in harmony with his equals and to protect the Church, he received the *accolade*, a slight blow on the neck with the flat of the sword from the person who *dubbed* him a knight. This was often done on the eve of battle, to stimulate the new knight to deeds of valor, or after the combat, to reward signal bravery. Though chivalry had its defects, chief among which, perhaps, was a tendency to certain affectations and exaggerations of sentiment, yet it tempered in a very beneficial manner the rudeness of feudal society. As a system of education for the nobles, it taught them the best ideals, social and moral, which the times could understand. (See illustration, with article FEUDALISM.)

CHLORAL, *klo'ral*, a colorless, oily liquid, commonly prescribed in the form of its hydrate. It is the poisonous principle in, "knock-out drops." The *hydrate of chloral*, as now prepared, is a white, crystalline substance, which in contact with alkalies, separates into chloroform and formic acid. Chloral kills by paralyzing the action of the heart. It is a hypnotic, as well as an anesthetic, and it is frequently substituted for morphia. It has been successfully used in delirium tremens, Saint Vitus's dance, poisoning by strychnia, lockjaw and some cases of asthma and whooping cough. It should be taken with great caution and under medical advice, as an extra dose may produce serious symptoms, and even death. In the treatment of poisoning by chloral, the person should be kept awake, his body warmed by friction or otherwise, and artificial respiration resorted to, if necessary.

CHLORATE, *klo'rate*, a salt formed by the combination of chloric acid with a base. Chlorates are decomposed by red heat, nearly all of them being converted into metallic chlorides with the evolution of pure oxygen. They burn so quickly with easily-burning substances that an explosion is produced by slight causes. The chlorates of sodium and potassium are used in medicine. The latter, in doses of from five to twenty grains, is largely used in scarlet fever and inflamed throat. It is also used in the manufacture of matches, fireworks, percussion caps and the like.

CHLORINE, *klo'rin*, or *klo'reen*, an elementary gaseous substance, discovered by Scheele in 1774. It was afterward proved by Davy to be a simple body, and was named from its peculiar greenish-yellow color, the word being derived from the Greek for *greenish-yellow*.

It is always found in nature in a state of combination. United with sodium it occurs very largely as the chloride of sodium, or common salt, from which it is liberated by the action of sulphuric acid and manganese dioxide. Chlorine is a very heavy gas, being about two and a half times as heavy as ordinary air; it has a peculiar smell, and when inhaled irritates the nostrils most violently, and also the windpipe and lungs.

During the World War chlorine-gas shells were among the most effective weapons used by the belligerents. Chlorine is not combustible, though it supports the combustion of

many bodies. In combination with other elements it forms chlorides, which have most important parts in many manufacturing processes, as well as chlorates and chlorites. As it is a very powerful bleaching agent, in the manufacture of bleaching powder it is used in immense quantities. It is a valuable disinfectant where it can be conveniently applied, as in the form of chloride of lime.

CHLORITE SCHIST, *klo'rite shist*, a mineral of a grass-green color, opaque, and usually friable or easily pulverized. It is composed of little spangles, scales, prisms or shining small grains, consisting of silica, alumina, magnesia and protoxide of iron. It is closely allied in character to mica and talc. See MICA; TALC.

CHLOROFORM, *klo'ro form*, a colorless liquid used extensively to deaden the sense of pain. Chloroform has a sweetish taste and smell, having a flavor somewhat like that of the apple. It was discovered in 1831 by three chemists, Guthrie of America, Soubeiran of France, and Liebig of Germany, but its value as an anesthetic was made generally known in 1847 by Sir James Y. Simpson, of Edinburgh. For this purpose its vapor is inhaled. The inhalation of chloroform first produces slight intoxication; then, frequently, slight muscular contractions, unruliness and dreaming; then loss of voluntary motion and consciousness, the patient appearing as if sound asleep, and at last, if too much be given, death by coma and syncope. When skilfully administered in proper cases, it is considered one of the safest of anesthetics; but in its use certain precautions must be observed. Chloroform is a powerful solvent, dissolving resins, wax, iodine, strychnine and other substances. See ANESTHETIC.

CHLOROPHYLL, *klo'ro fil*, the green coloring matter of plants, which plays the most important part in plant life. It performs a function for plants similar to the function of the gastric juice in animals. It breaks up the carbonic acid gas taken in by the leaves, into two elements, returning the oxygen to the air and converting the carbon, with the water obtained from the roots, into starch. Starch can be formed by leaves only in the presence of light. Hence, leaves which are deprived of light, bleach or turn white. See BOTANY.

CHOATE, *chote*, JOSEPH HODGES (1832-1917), one of the greatest of America's

lawyers and an able diplomat, was born at Salem, Mass. He was educated at Harvard University and Law School, and settled in New York, where he gained the highest distinction as a lawyer, especially in the prosecution of the Tweed Ring and in the Income Tax Cases before the Supreme Court. He represented the United States in disputes with Canada over the Alaska boundary and other matters, and in 1899 he was nominated by President McKinley as ambassador to Great Britain. He served with rare ability until 1905, when he returned to his practice in New York.

CHOCOLATE, *chok'o late*, a paste composed of the kernels of the cacao tree, ground and combined with sugar and vanilla, cinnamon or other flavoring substance; also, a drink made by dissolving chocolate in boiling water or milk. The cocoa bean, from which chocolate is made, is the seed of a mushy pod, which is the fruit of the cacao, or cocoa tree (see CACAO).

The cocoa bean is about the size of a pecan nut. The kernel of the bean is called the *nib*, and from the nibs chocolate and cocoa are made. The beans are roasted for the purpose of making the shells brittle, so they will come off easily. When cooled, the beans are run through a machine, which removes the shells and leaves the nibs free and clean. The nibs are then ground to a thick paste. The ground chocolate is placed in kettles for more complete stirring; then, after having been transferred to tins, it is taken to the cooling room to harden into cakes, which are afterwards wrapped for shipment.

Chocolate in any form is a valuable food, as the roasted beans are rich in fat and also contain protein, starch and other carbohydrates. Chocolate for drinking if made with milk is a more suitable beverage for a luncheon than for a heavy dinner, because of its energy value. It has been estimated that two ounces of cake chocolate, two slices of bread and a glass of milk have a fuel value of 660 calories; this combination is a nutritious luncheon for the average person.

CHOC'TAW, in former days the most advanced and one of the largest of the Indian tribes, living originally in the southern part of the United States, east of the Mississippi. De Soto met them in 1540 and fought with them a bloody and destructive battle. When the French came, the Choctaw immediately formed a friendship with them. Under

United States rule they met with the fate of other tribes, and in 1837 they were removed to the Indian Territory, where they established their independent government, built churches, erected school buildings and under a well-established system of laws lived happily till their friendship with the South in the Rebellion lost for them a large portion of their lands. At the present time they form a prosperous and influential body of citizens in the state of Oklahoma. They number about 10,000 but are slowly decreasing. See FIVE CIVILIZED TRIBES.

CHOKE DAMP, a heavy gas found particularly in mines, so called because it extinguishes both plant and animal life. It is composed almost entirely of carbon dioxide, or carbonic acid gas (which see).

CHOLERA, *kol'era*, a general name applied to several forms of intestinal trouble.

Asiatic Cholera is a contagious disease of the Far East, having its permanent seat in Lower Bengal. In former times it was one of the deadliest scourges of mankind, causing an appalling loss of life not only in Asia, but in Europe and even in America. As it is a disease that flourishes where filth prevails, it has been conquered by means of sanitation and hygiene. In the Philippine Islands it has been practically exterminated through the efforts of the American sanitation service, and is no longer a menace in any progressive country. Its early symptoms are slight fever, nausea, vomiting, headache, diarrhoea and prostration. Later the patient excretes a watery substance containing pieces of mucous membrane, and this stage is followed by collapse. Death or recovery marks the fourth or final stage of an attack. There is no specific drug known which will cure, but treatment is along hygienic lines.

Cholera Morbus, a painful but usually not a dangerous disease, caused in most cases by eating food containing harmful bacteria. It occurs usually in the summer, and may be brought on by overeating or by drinking too much ice water. Cramps, diarrhoea, vomiting and exhaustion are its symptoms. An attack is treated by purging the digestive tract and giving drugs to ease the pain. Total fasting for a number of hours is also required of the patient.

Cholera Infantum, an infantile disease responsible for a large number of deaths every summer among babies. It is caused by heat, bad sanitation and careless feeding, and is an

especial foe of babies fed from bottles and those reared in the poorer districts. The disease has three marked symptoms—excessive diarrhoea, fever and great weakness. Usually an attack starts with violent vomiting and bowel movements, but in some cases there is a preliminary spell of high temperature, diarrhoea and failing appetite. At first the child excretes milk curds and other bits of food, mingled with liquid waste, but the later stools are thin and colorless and leave a greenish stain. With the bowel movements occur persistent vomiting spells, and the patient continually grows thinner and weaker. In severe cases coma and convulsions may result at the end of eight or ten hours, followed by death, but milder attacks yield to treatment at the end of a few days. The first favorable sign is checking of vomiting.

Any baby showing indications of cholera infantum should be placed at once in the care of a good physician. Treatment consists of stomach washing, injections and the administration of such drugs as the physician prescribes. In hot weather the mother should be doubly careful about keeping the surroundings and body of the baby clean, and should protect the child from flies, impure food and all other disease breeders.

CHOPIN, *sho paN'*, FREDERIC FRANCOIS (1809–1849), a celebrated pianist and musical composer, of French extraction, born at Warsaw, Poland. He went to Paris in 1831, on account of the political troubles in Poland, and lived there many years.

As a pianist he attracted the attention of critics before he was twenty years old, and at the same age he had composed several mazurkas and nocturnes. These are still among the best extant, as he himself never excelled and rarely equaled his early powers. All of his works display a rare combination of poetic fancy and beautiful melody, and they abound in passages of the greatest difficulty, but are never harsh or strained. His *Funeral March* is probably the most impressive composition of its kind ever produced.

CHORD, *kord*, in music, the simultaneous sounding of different tones. The common *chord* consists of a fundamental note and the third and fifth notes in the scale beginning with the fundamental note. When the interval between the fundamental note and its third is two full tones, the combination is a *major chord*; when the interval is a tone

and a half, the combination is termed a *minor chord*; when the intervals between the bass note and its third, and between the third and the fifth, are each a tone and a half, the chord is called *diminished*. The *tonic chord* is made up of the key note and its third and fifth; the *dominant chord* consists of the dominant, or fifth, of the scale, accompanied by its third and fifth; the *subdominant chord* consists of the subdominant, or fourth, of the scale, and its third and fifth.

CHOREA, *ko re'ah*. See SAINT VITUS'S DANCE.

CHORUS, *ko'rus*, originally an ancient Greek term for a troop of singers and dancers, intended to heighten the pomp and solemnity of festivals. During the most flourishing period of ancient tragedy (500–400 B. C.), the Greek chorus was a troop of males and females, who, during the whole representation, never quitted the stage, in the intervals of the action chanting songs. In the beginning it consisted of a great number of persons, sometimes as many as fifty; but the number was afterward limited to fifteen.

In modern music the chorus is that part of a composite vocal performance which is executed by the whole body of singers, in distinction to the solo airs and passages for selected voices. The singers who join in the chorus are also called the chorus. The term is also applied to the refrain sung at the end of each stanza of a song.



A native costume

CHOSEN, *cho sen'*, a province of the Japanese Empire in Eastern Asia, known prior to 1910 as the kingdom of Korea. It is a peninsula extending southeasterly toward the Japanese islands between the Sea of Japan and the Yellow Sea. The area of the province is 85,228 square miles—about the same as that of Utah—and its population in 1933 was 20,599,876.

When annexation occurred many Koreans moved westward into Chinese or Russian territory, but the Japanese who entered the new possession more than offset the loss in population.

The People. The native Koreans are supposed to have sprung from the intermarriage of Chinese, Ainos and other races, and are of Mongolian descent, but are taller, heavier and lighter-skinned than most Mongolians. Their features, too, are more regular than those of the typical Mongolian. Over 20,000,000 Koreans are found in Chosen, and more than 525,000 Japanese. Chinese are next in order, numbering about 25,000; of the other races the most numerous are the British, French and American, but these all told number fewer than 2,000.

The Koreans speak a language that is intermediate between Mongolo-Tartar and Japanese, and has many Chinese words. Their written language is a mixture of native and Chinese characters. In official correspondence Japanese is used, except in transactions among the native provincial officials. The people are very superstitious in their religious beliefs, and are ancestor and spirit worshippers. Christianity is making headway through the devoted efforts of missionaries, who have established churches, mission schools and hospitals.

Instruction. Before the annexation of Chosen by Japan, a knowledge of Confucianism and of the Chinese classics was considered necessary in the education of the upper classes, but modern ideas of education have become prevalent since Japanese occupation. The government provides elementary education for boys and girls alike, and many mission schools for them have been established throughout Chosen. A general Education Department supervises both the government and the mission schools. At Suigen a model farm and agricultural school have been established, and technical and industrial schools are gradually being founded. Fully 60 per cent of the Koreans are illiterate, though there are about 2,100 common schools. There is a university in Seoul.

The Land. A mountain range extends the entire length of the kingdom along or near the northwest and the eastern shore, and this contains peaks varying in height from 4,000 to 8,000 feet. To the south and west the land slopes gently to the coast. The mountains are well wooded, as is most of the northern part of the country. The southern and western sections are covered with fertile soil, contain numerous streams and are in other ways well suited to agriculture. The climate in the north resembles that of China in the same

latitude. The winters are somewhat severe and the summers warm. The climate of the southern part of the kingdom resembles that of Japan, being mild and equable. Everywhere there is sufficient rainfall for agricultural purposes.

Mining. The mineral resources include coal, found in the west-central part; gold, which is obtained along the rivers in the north; copper, lead ore, and granite, limestone and other building stones. Mining has not been extensively developed, but concessions have been granted to foreigners for exploiting the gold mines, most of which are in the hands of Americans, but which are gradually being taken over by the Japanese government. The most prosperous mines are at Unsan. In the northern part of the country anthracite coal mines are in operation, but the most important mines produce bituminous coal.

Agriculture. The greater part of Chosen is well suited to farming, but the backwardness of the methods used and difficulties in the way of transportation have prevented full development of the country's resources. Improvement, however, is being made, and the outlook is promising. Over 12,000,000 acres are under cultivation, about 2,000,000 of which are given over to rice, the most important food product. Wheat, millet, barley, soy beans, peas, red beans, cotton, tobacco, hemp and ginseng are also raised. The government is encouraging the development of the silkworm industry, as mulberry trees are numerous. Livestock, especially cattle, are raised as a by-product of agriculture.

Manufactures. The manufactures are limited and are at present confined to the weaving of fabrics from hemp and grass, the manufacture of coarse cotton and silk cloth, mats, bamboo screens, inlaid ware, tobacco goods, pottery and leather, and the manufacture of paper of a peculiar quality, used by the natives in making hats, other articles of clothing and umbrellas. Formerly the Koreans were noted for their skill in those arts which now are characteristic of the Chinese and Japanese, and it is supposed that these arts were introduced into Japan through Chosen.

Fisheries. Whale fishing is an important industry in the northern waters, and had-dock, halibut, herring, sardines and other fish are caught in large numbers off the coasts. A Marine Products Association for the en-

couragement of the fishing industry has been formed, receiving an annual subsidy from the government.

Transportation and Communication. Roads throughout Chosen are for the most part very poor, though improvements are gradually being made. In the interior goods are transported by porters, oxen and pack animals, and by boat. The upper classes have been accustomed to traveling about by means of sedan chairs or on horseback, but railways are gradually being constructed. There are now about 1,825 miles of track in the province. The railway system is connected with the Siberian and Chinese lines, and a modern through express makes tri-weekly trips from Fusan, on the southern coast, to Chang-chun, in Manchuria, by way of Seoul, the capital. From Chang-chun a train runs to Harbin, making connection with the Trans-Siberian Railway. In Seoul there is an electric railway which connects with points three miles outside the city. In the province there are more than 800 post offices, and 26,000 miles of telegraph in operation. In the towns there is telephone service, with 725 exchanges.

Commerce. There are twelve open ports in the province, and trade is carried on with Japan, China, the United States, Great Britain and Asiatic Russia. The chief imports include cotton goods, cotton yarn, machinery, silk goods, timber, kerosene, sugar, paper and coal; rice, beans, cowhides and cattle are exported.

Government. The chief executive official is a Japanese governor-general. He is assisted by heads of various departments, and by a central council composed chiefly of Koreans. The judicial, prison, tariff, land and railroad systems are under control of the Japanese government at Tokyo, but native officials administer for the most part the villages and districts.

History. According to tradition a Chinese statesman named Ki-tse founded a nation on the peninsula about 1100 B. C. In 108 B. C. the country became a part of the Chinese Empire, and a little over a century later it was divided into three principalities. About 960 one of these, called Kori, absorbed the others, and for the next 300 years the country (Kori, or Korea) existed as an independent nation. During this time the arts flourished, and Buddhism obtained a very strong hold upon the country. In 1392 Buddhism

was overthrown by a revolution, a new dynasty was established, and the name Chosen, meaning *morning freshness*, was adopted.

Late in the sixteenth century the Japanese invaded the peninsula, but were finally driven out by aid of the Chinese. Chosen again became tributary to China, and was nominally so until 1895, the last year of the Chino-Japanese War. In 1897 the sovereign adopted the title emperor, and the independence of the kingdom of Korea was recognized by both China and Japan. The Japanese, however, gradually extended their influence over the country, and on August 23, 1910, it was formally annexed to the Japanese Empire. At this time the name Korea was abolished.

Related Articles. Consult the following titles for additional information:
Chinese-Japanese War Russo-Japanese War
Japan, subhead History Seoul

CHRIST (meaning *an anointed one*), a title of Jesus of Nazareth, now used almost as a name or as part of his name. See JESUS CHRIST.

CHRISTCHURCH, NEW ZEALAND, capital of the province of Canterbury and the see of the primate of New Zealand, situated on the Avon River, seven miles from the sea. Its port is Lyttelton. It contains a number of handsome buildings, among which are the provincial government offices, the cathedral, Saint Michael's Church, the supreme court and the town library. There are high class educational institutions, a fine park and a botanic garden. Population, 1931, 126,040.

CHRISTIAN IX (1818-1906), a highly respected king of Denmark, who succeeded to the throne in 1863. His family connections among the reigning houses of Europe were remarkable, and he was called the "father of the royal houses of Europe." His eldest daughter, Alexandra, was the wife of Edward VII of England; his second daughter, Dagmar, the mother of former Czar Nicholas II of Russia; his second son, George I, was king of Greece. His grandson became king of Norway in 1905 as Haakon VII.

CHRISTIAN X (1870-), king of Denmark, son of Frederick VIII and grandson of Christian IX. He succeeded to the throne on May 14, 1912, on the death of his father. He was not without experience in the affairs of the kingdom, for he had frequently been left in charge during his father's absence. He became a popular

sovereign, but never was obliged to meet a crisis until 1914, when the World War began. In December of that year a conference of the kings of Denmark, Norway and Sweden was held at Malmö, Sweden, at which the three sovereigns agreed to maintain strict neutrality throughout the war.

CHRISTIAN ENDEAVOR, THE UNITED SOCIETY OF, an interdenominational religious organization of young people of the Protestant churches. The first society was organized by Rev. Francis Clark, D.D., at Portland, Maine, in 1881, and numbered about fifty members. There are in excess of 80,000 local chapters, with a membership of over 4,000,000, representing eighty denominations. The principles upon which the society is founded are:

"Personal faith in Jesus Christ; loyalty to the individual church and to the denominational organization and loyalty to the universal church of Christ in every land."

The society has an interdenominational board of over 100 trustees, whose powers are simply advisory and who act as a bureau of information; it is in no sense a body of control. Every local society is entirely under the control of its own church and denomination.

CHRISTIAN ERA, the great era now almost universally employed in Christian countries for the computation of time, supposed to begin with the birth of Christ. The custom of reckoning time from the birth of Christ was introduced in the sixth century by a monk named Dionysius; but it is believed that in his computations he made a mistake of a few years, so that, according to the best authorities, Christ was born about four years before the beginning of our era. The practice of computing time from Christ's birth did not become general until the fifteenth century. The symbol used for dates of the Christian Era is A. D., standing for *Anno Domini*, or *in the year of our Lord*.

CHRISTIANIA, *kreeste ah'ne a*, renamed **OSLO**, NORWAY, the most important seaport and the capital of the kingdom, situated at the head of the long, narrow inlet called Oslo Fjord, about eighty miles from the Skagerrak, an arm of the North Sea. It consists of the city proper and a number of populous suburbs. Among the important buildings are the royal palace, the Parliament House, the governor's palace, a citadel, the great arsenal of the kingdom, a university, the Trinity

Church and the cathedral. Attached to the university, the only one in Norway, opened in 1813, is a museum containing a fine collection of antiquities. The manufactures consist of woolen cloth, ironware, tobacco, paper, leather, soap, spirits and glass. The harbor is spacious and deep, and into it are brought half of the country's imports. On January 1, 1925, by vote of parliament, Christiania resumed its ancient name of Oslo. Population, 254,000.

CHRISTIANITY, the religion instituted by Jesus Christ. It teaches that there is no salvation without Christ's atonement, without faith in God and a belief in the gospels. Though the great moral principles which it reveals and teaches and the main doctrines of the gospel have been preserved without interruption, the genius of the different nations and ages has materially colored its character. The first community of the followers of Jesus was formed at Jerusalem soon after the death of their Master. Another was formed at Antioch in Syria about A. D. 65, where the followers of Jesus were first called *Christians*. The travels of the apostles spread Christianity through the provinces of the Roman Empire, Palestine, Syria, Asia Minor, Greece, the islands of the Mediterranean, Italy and the northern coast of Africa, as early as the first century. At the end of the third century almost one-half of the inhabitants of the Roman Empire, and of several neighboring countries, professed this belief, and in the twentieth century it is still spreading through missionary work.

Many heretical branches sprang from the main trunk. From the Gnostics, who date from the days of the apostles, to the Nestorians of the fifth century, the number of sects was large, and some of them exist to the present day. The most important events in the subsequent history of Christianity are the separation of the Eastern and Western churches early in the eighth century, and the Western Reformation, which resulted in the establishment of Protestantism in the sixteenth century. The number of Christians now in the world is computed at 564,500,000.

CHRISTIANS. See DISCIPLES OF CHRIST.

CHRISTIAN SCIENCE, a religious system originated by Mary Baker Eddy, whose book, *Science and Health with Key to the Scriptures*, contains a complete statement of its teachings and practice. The church organization is known officially as the Church

of Christ, Scientist, and its members as Christian Scientists.

Christian Science is based upon the proposition that God is all in all, the only self-existent, infinite Being or Life, and that man in the image and likeness of God is spiritual and not material. This system of religious teaching differs from all others in its declaration that evil and matter are unreal and illusive, since God who is infinite Good and is Spirit, or Mind, cannot create, or be manifested in, anything unlike Himself. The truthfulness of this concept, it is declared, can be and is proved by actual demonstration of healing and regeneration through Christ as the universal spiritual ideal. Christ Jesus is regarded by Christian Scientists as the individual ideal of Truth.

The denomination has over 2,000 church organizations in the world. Large and beautiful church edifices have been erected and dedicated in most of the large cities of the United States and Canada, of England, and in other parts of the world. The Christian Science Church was founded by Mrs. Eddy in 1879 "to commemorate the word and works of our Master, which should reinstate primitive Christianity and its lost element of healing." In 1892 the Church was reorganized as the First Church of Christ, Scientist, in Boston, Massachusetts, known as The Mother Church. All Christian Science churches are branches of the Mother Church. Lesson-sermons compiled from the Bible and *Science and Health with Key to the Scriptures* are read at the Sunday services in these churches.

All Christian Science churches maintain free public reading rooms where those seeking information on the subject of Christian Science have access to the Bible, *Science and Health*, Mrs. Eddy's other works, and the periodical literature of the denomination. The Church periodicals include *The Christian Science Journal*, a monthly; *The Christian Science Sentinel*, a weekly; and *The Christian Science Monitor*, a daily newspaper. Over 5,000 authorized Christian Science practitioners are regularly devoting their time to the practice of Christian Science Mind healing. See EDDY, MARY BAKER.

Many people whose attitude toward Christian Science has been unfriendly prophesied that with the death of Mrs. Eddy, which occurred in 1910, the organization would begin to weaken. However, the passing of the leader had no such effect.



CHRISTMAS, *kris'mas*, the most important festival of the Christian Church, observed annually on December 25, in memory of the birth of Christ. The time when the festival was first observed is not known with certainty; but it is spoken of in the beginning of the third century by Clement of Alexandria, and in the latter part of the fourth century Chrysostom speaks of it as of great antiquity. As to the day on which it was celebrated, there was long

considerable diversity, but by the time of Chrysostom the Western Church had fixed on December 25, though no certain knowledge of the day of Christ's birth existed; and the Eastern Church, which had favored January 6, gradually adopted the same date. The existence of heathen festivals celebrated on or about this day doubtless accounted in large measure for its selection; and Brumalia, a Roman festival held at the winter solstice, when the sun is, as it were, born anew, has often been mentioned as having a strong bearing on the question.

In the Roman Catholic, Greek, Anglican and Lutheran churches, there is a special religious service for Christmas day; and, contrary to the general rule, a Roman Catholic priest can celebrate three masses on this day. In homes in all Christian countries, Christmas is a day of household festivities, family reunions and joy for the children. The widespread practice of presenting gifts at Christmas time has probably some connection with the gifts presented to the Child Jesus by the three Wise Men. Within recent years many towns and cities have adopted the custom of setting up community Christmas trees in centrally located places, and holding public gatherings at which carols and hymns are sung.

CHRISTY, *kris'ti*, HOWARD CHANDLER (1873-), an American illustrator, best known as the originator of a definite and charming type of pictures of society girls. He was born in Morgan County, Ohio. In 1893 he went to New York, and soon afterward his work began to appear in magazines.

Christmas Programs

I

I heard the bells on Christmas Day
 Their old, familiar carols play,
 And wild and sweet
 The words repeat
 Of peace on earth, good-will to men'
 —Longfellow.

Song, Little Children, Wake and Listen
 —From Williamson's Children's Manual
 The Story of the Wise Men.....
Matt. II, 1-12
 Old Christmas.....Sir Walter Scott
 Song, Silent Night, Holy Night
 The Hummels' Christmas Breakfast
 Scene from Little Women.....Alcott
 Christmas Morning.....Edwin Waugh
 Holly Drill by Girls.....Original
 Song, The First Nowell.....Old Carol
 A Visit from Santa Claus.....Moore
 Christmas Day in Foreign Lands.....
Original
 The Little Match Girl.....Andersen
 Dialogue, Old Serooge and His Nephew
 (Adapted from Dickens' Christmas.....
Carol)
 The Spirit of Christmas To-day.....
Original Essay
 Song, Once in Royal David's City.....
Alexander

II

He comes in the night! He comes in
 the night!
 He softly, silently comes;
 While the little brown heads on the pil-
 lows so white
 Are dreaming of bugles and drums.
 He cuts through the snow like a ship
 through the foam.
 While the white flakes around him
 whirl;
 Who tells him I know not, but he find-
 eth the home
 Of each good little boy and girl.

Song, Away in a Manger.....Luther
 The Story of the Shepherds.....
Luke II, 8-18
 The Three Kings.....Longfellow
 Christmas Quotations.....Selected
 The Christmas Tide.....Sangster
 Song, O Little Town of Bethlehem.....
Brooks
 The Party at Caleb Plummer's
 Scene from Cricket on the
 Hearth.....Dickens
 Christmas.....Tennyson
 Debate, Should Children be Taught
 the Santa Claus Myth?
 Song, What Child Is This?.....Old Carol
 Legend of Saint Christopher.....Adapted
 Jest 'Fore Christmas.....Field
 Community Christmas Celebrations..
Original Essay
 Song, God Rest Ye, Merry Gentlemen..
Old Carol

During the Spanish-American War Christy went to Cuba, and furnished articles and illustrations for *Scribner's Magazine*, *Harper's Magazine* and *Collier's Weekly*. He illustrated many works of fiction, and each year for several years produced pictures in color for a gift-book edition of some one of Riley's poems.

CHROMATIC, *kro mat'ik*, in music, a term applied to notes and peculiarities not belonging to the diatonic, or standard, scale. Thus, a *chromatic chord* is a chord which contains a note or notes foreign to the diatonic scale; *chromatic harmony*, harmony consisting of chromatic chords. The *chromatic scale* is a scale made up of thirteen successive semitones, that is, the eight diatonic tones and the five inserted intermediate tones. See MUSIC.

CHROMIUM, *kró'mi um*, a shiny, silver-colored metal which is not used in the pure form, but, combined with iron and carbon, forms *chrome steel*, or *stainless steel*, which is much stronger than ordinary steel. It is derived from the mineral *chromite*, or chrome iron ore, a compound of iron, chromium and oxygen. As material for plating on iron, steel, brass, copper, and other metals, it produces hardness of surface almost equal to that of the diamond. Chromium plating is impervious to rust, thus finds a great number of uses on exposed parts. Its alloys are valuable; chromium steel is used in airplane engines, high-speed tools, etc. Steel with 15 per cent chromium produces stainless steel.

CHRONICLES, *kron'e klz*, BOOKS OF (acts of the days), two books of the Old Testament, which formed only one book in the Hebrew canon, in which it is placed last. Its division into two parts is the work of the Seventy, who gave it the title *Paraleipomena*, meaning *things omitted*. The name *Chronicles* was given to it by Jerome. The book is one of the latest compositions of the Old Testament and is supposed to have been written by the same hand as *Ezra* and *Nehemiah*. According to its contents the book forms three great parts: 1, genealogical tables; 2, the history of the reigns of David and Solomon; 3, the history of the kingdom of Judah from the separation under Rehoboam to the Babylonian captivity, with a notice in the last two verses of the permission granted by Cyrus to the exiles to return home and rebuild their temple.

